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**PETROLIFEROUS PROVINCES OF UNION OF SOVIET
SOCIALIST REPUBLICS¹**

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ABSTRACT

The purpose of this study is to give a picture of present and ultimate oil possibilities of the U.S.S.R., so they may be compared with those of the United States. Following an outline of source material for the study, a general picture of the structure and tectonics of Eurasia and Siberia is given as the background to differentiate oil-bearing from oil-barren regions. The oil and gas deposits occur in reservoir beds similar to those in the United States, ranging from Devonian to Pliocene strata inclusive. It is possible that Silurian and Ordovician will also produce, and a small amount of oil has been reported from Cambrian beds. The structure and the stratigraphic types of occurrence are also similar. A more detailed picture of each possible oil region, both productive and prospective is presented, with a comparison of their relative merits. It is shown by the map that out of 8,396,000 square miles of land-inland sea area within U.S.S.R. boundaries, 3,600,000 square miles have possibilities for the finding and production of oil; and in addition there are 400,000 square miles of continental-shelf area within the 200-meter depth limit. Of the total possible area, 1,000,000 square miles are classified as younger marine sedimentary (Cretaceous to Pliocene) deposits. Also of the total, there are 1,530,000 square miles north of the 60° parallel; hence, they are more difficult and expensive to develop.

Production to the beginning of 1947 in U.S.S.R., inclusive of Sakhalin, was 5,722,000,000 barrels; in 1946 it was 166,000,000 barrels, two-thirds of that of 1939. Total production in the United States was 34,000,000,000 barrels, while that in 1946 was 1,754,000,000, about 50 per cent more than that of 1939.

Total estimated proved reserves of the Soviets are nearly 8 billion barrels, while those of the United States are 24 billion barrels.

While the U.S.S.R. has barely begun development, having only 12,000 oil wells, the United States is well advanced with 424,000 producing wells. It will therefore require a long period of time, large capital investments, much of machine tools and other machinery adequately to develop the Soviet possibilities.

Exploration and development in the Soviet Union are being carried forward by use of latest techniques developed in the United States and elsewhere, with some new Soviet methods. It is reported that more than 2,000 geologists and geophysicists are employed at present by the Union; and engineers and technical workers are probably likewise numerous.

The affiliated countries under Soviet control are Roumania, Hungary, Czechoslovakia, Yugoslavia, Albania, and Poland, which cover an area of 427,000 square miles. These include two important

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basins, the Hungarian and Roumanian inclusive of the Sub-Carpathian region, which covers 130,000 square miles of prospective territory, with the Roumanian district much more important. The proved reserves are estimated as ranging from 241,000,000 to 491,000,000 barrels, with estimates for Roumania ranging from 150,000,000 to 400,000,000 barrels. Production to date is 1,459,000,000 barrels, and during 1946 it is estimated as 44,000,000 barrels. It is down 25 per cent in Roumania due to the last war, but the possibilities of developing important new production are considerable as the Roumanian basin is one of the best in Europe and similar to the Gulf Coast of the United States. The U.S.S.R. has been getting 95½ per cent of the Roumanian output because of its great need for oil, but it is reported that some of this is to be released shortly, perhaps to other East European states now that the United States has ceased exporting oil to them. Outer Mongolia and Tannu Tuva, also affiliated, have little or no oil prospects.

Lewis G. Weeks' estimate of United States sedimentary basins exploitable for oil is 1,400,000 square miles, to which he gives an ultimate estimated production of 100,000,000,000 barrels.

Comparing Soviet areas in kind with those given by Weeks for certain United States regions, and allowing for average depth of favorable sedimentary strata in each basin judged by available data, the writer obtains for the U.S.S.R. the following figures inclusive of land and continental shelf.

For the more important districts, namely, Moscow-East Russian basin, Pre-Caspian and extensions, Transcaspian, South Caucasus, and East Sakhalin, the estimated total area is 1,805,000 square miles, with sedimentary rocks totaling 2,736,000 cubic miles and having an oil-gas content of 162,000,000,000 barrels. Additionally of much more speculative character, 1,650,000 square miles, with an estimated total of 1,708,000 cubic miles of sedimentary rocks, may ultimately yield 33,000,000,000 barrels. Of this, only 6,000,000,000 barrels have been produced and about 8,000,000,000 barrels proved, leaving the balance to be found and developed, a truly stupendous task, although a large number of mapped structures await adequate testing.

It appears probable and reasonable, therefore, to conclude that the Soviet Union has within its own borders an ultimate oil reserve of at least 150-160 billion barrels, and conceivably it may approach 180-190 billion barrels. By allowing for areas under Soviet control, it is clear that the U.S.S.R. dominates more than a third of the total ultimate oil reserve of the entire world.

Soviet Russia has ample other power resources. It is second to the United States in coal reserves. It also has abundant oil-shale deposits, which as well as the coal, may be converted to oil and gas as required. Its hydro-electric power possibilities are very large. Development of coal has been considerable, there has been some development of oil shale for both oil and gas production, and while hydro-electric development has barely begun, construction of 15,000,000 kilowatts is planned. Of its atomic-energy minerals, there is ample territory favorable for their vein occurrence in its large pre-Cambrian and shield areas; in addition, Eklund estimates one million tons of ordinary uranium extractable from Soviet oil shales and states the United States and Sweden, each has a like amount. The Soviets are resources-rich, but development-poor. This emphasizes how very great is the Soviet need for a long period of peace-time development of its great power resources, whereas the United States, through its combined individual, corporation, and government effort has reached a greatly advanced stage. Both countries can with continued development be self-contained as far as power resources are concerned for centuries to come.

This paper is a discussion of the oil-bearing provinces of the U.S.S.R., both developed and undeveloped. The map outlines the likely areas; such limits may not coincide with published studies or basinal boundaries, but they represent the writer's idea of the practical limits for exploration by evaluation of the basic geology. While large areas are eliminated as of little or no promise, heretofore considered promising by some geologists, others are added. It is 20 years since Arthur H. Redfield gave the A.A.P.G. a paper attempting by a somewhat similar approach to give an outline of the oil resources of Russia. The present study was undertaken because it seems imperative with the growing importance of the U.S.S.R. that we in the United States have a better basis for comparison of its oil-reserve areas and our own. While it is not possible to present quantitative estimates, it is possible to evaluate the relative importance of provinces and districts based on (1) extent of area outlined, (2) character of sediments, whether continental or marine, (3) thickness of sediments, and (4) extent and age of folding with consideration of effects of folding on older and younger strata.

A selected bibliography on the geology, cartography, and the oil industry of the U.S.S.R. is appended, but the principal sources on which this study is based are: the excellent geologic map of the U.S.S.R. on the scale of 1:6,000,000, published for the Moscow meeting of the 17th International Geological Congress; the tectonic map published in the *Soviet World Atlas*; the paleogeologic, paleogeographic, and tectonic maps of Arkhangelski (Eurasia), Orbruchev (Siberia), Gregory and Grabau (Asia), Leuchs (North and Central Asia), and Bubnoff (Europe), Beyschlag-Shriell-Stille (Europe). The Arkhangelski gravity and magnetic maps of Russia and southwestern Siberia were very helpful in studying fundamental elements. The papers given at the Geological Congress of 1937, geological papers from the U.S.S.R. Academy of Sciences, papers in *Oil Industry*, and in the *Prospecting Journal of Geological Institutes*, together with the studies previously published in the A.A.P.G. *Bulletin* and elsewhere, particularly those of Goubkin, Brod, Zavoico, and Marshall Kay are of great importance. Since it is not the present purpose to give details of either geology or oil fields, the appended select bibliography may be used for such references; for detailed lists of producing fields, statistics, and a good general review, the sections of the *Oil Weekly* "Oil World Atlas," covering the U.S.S.R. and affiliated states, are recommended. For a quick over-all geologic description of districts the papers in Volume I of *Science of Petroleum* are recommended. Indebtedness is acknowledged to all these sources, though no attempt has been made to specify them.

The tightening of information due to U.S.S.R. war security measures makes it difficult to get reports on the present or recent status of oil fields, including their production; this holds good for the U.S.S.R. and affiliated states as well as for states still partially under U.S.S.R. control. Though Soviet geologic reports are published, details on important new districts and extent of development have been withheld. It has been necessary therefore to use estimates of the *Oil Weekly* (now *World Oil*) on production, wells drilled, *et cetera*.

The U.S.S.R. covers half of Europe and of Asia. It has an area of 8,350,490 square miles, one-sixth of the earth's surface. The European states, Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Roumania, and Yugoslavia, now under its political control, add 426,924 square miles, and Asia, Outer Mongolia, and Tannu Tuva further add 622,744 square miles, giving the Soviets control of 18.4 per cent of the earth's surface. In comparison, the United States with 3,022,000 square miles and its territories with 597,000 square miles, give an area which is 3.2 per cent of that under U.S.S.R. control.

Considering its vast area, it is not surprising that the U.S.S.R. contains eight petroliferous provinces, consisting of ten major basins and fourteen minor districts which may produce oil and gas. Production has been obtained in six of the major basins and their extensions. The West Siberian lowlands, Northeast Siberia and Kamchatka provinces, remain almost unexplored. Soviet oil fields produce only 500,000-600,000 barrels daily, placing U.S.S.R. on a producing plane with the United States of 30 years ago. But Soviet Russia with its vast

basic resources, with more than 2,000 geologists and geophysicists (1945) engaged in oil exploration as well as a large staff of engineers, technicians, and workers, should speedily develop a much larger production. It is reported to have developed some new techniques and has the further advantage of those perfected in the United States and elsewhere in the past 30 years.

The strata in which oil is being sought range from Cambrian limestones through Pliocene, with the greatest production to date from Pliocene, Permian, Carboniferous, and Jurassic beds and with much new production coming from Lower Carboniferous and Middle Devonian limestone. The Silurian and Ordovician should also produce but no production is reported. Cretaceous areas are practically untouched. While there is some Jurassic production it is relatively small compared with areas underlain by Jurassic; some of the latter are large; many of them are overlain too undisturbed to produce; more of the deeply buried Jurassic will undoubtedly show production later. Just as Cambrian production is inconsequential in the United States, it probably will be of little importance in U.S.S.R.

Thus far, most of the production has come from anticlines and domal uplifts, only a small amount from stratigraphic traps. A marked feature of many of the developed domes in the Baku, Kuban, and East Russian basins is that they are of the elongate ellipsoidal type, cut with epi-anticlinal or transverse faults. Salt-dome production has been principally from the Emba basin, to a small extent from the Ukraine. In all important basins because of effect of shield areas and mountain uplifts, there is everywhere a plenitude of folding and faulting.

GENERAL STRUCTURE

An over-all tectonic picture of Eurasia is outlined in the following paragraphs.

In Russia proper, there is on the northwest the Fenno-Scandia shield, a large pre-Cambrian massive and positive element, on the east are the Ural Mountains of Variscan orogeny, and between lie the Moscow, Pechora, and East Russian basins, constituting part of the Russian platform. An offshoot of the Urals trending northwest is the Timan range and between it and the northern Urals lies the Pechora basin. The movement of the Urals westward toward the pre-Cambrian massive Fenno-Scandia is probably explanatory of the productive folds of the East Russian basin. The Urals, being overturned toward the west, may have important buried structures below the unconformity.

Southern Russia has two positive elements: the Voronezh block which extends eastward from the south end of the Fenno-Scandia shield and the Podolian block of the Ukraine, which is a mass of intrusives in old rocks. Between these blocks is the Ukrainian (South Russian) basin, which is the westward extension of a geosyncline extending into southwest Siberia. South of the East Russian basin is a deeper extension, the Pre-Caspian (Astrakhan-Emba). Still farther south is the uplift of the Mangyshlak Mountains. This is a buried uplift beneath the Caspian Sea and northeastern Kuban; north of Rostov-on-Don, it is part of the

Ukraine area. The Mangyslak uplift is a continuation of the axis of the Hissar-Tien Shan Mountains. South of this axis is the Kuban syncline which extends westward through the Sea of Azov, northern Crimea, and Bessarabia; east of the Caspian Sea, it continues as the Turkmen-Uzbek (Kara Kum) basin. On the south of this syncline are the Caucasus Mountains and their southeastward extension, the Kopet Dag Mountains from Krasnovodsk to Ashabad in Turkmen S.S.R. South of the Caucasus is the Kura River-Baku-Nebit Dag basin, which in turn is limited on its south by the Elburz Mountains of Iran.

A glance at the tectonic elements of the remainder of Siberia and adjacent territory gives the following picture.

In the Arctic are the Kara Sea and East Siberian Sea shield areas. The first shield is rimmed on the south with the Ob-Khatanga depression and the second by a slightly depressed old Paleozoic complex north of the Cherski Mountains. In north-central Siberia there is the great Anabar shield area on the east, with the Angara-Yenisei horst block on the southwest, and the shallow Tunguska River basin between. The Upper Lena-Aldan River basin occupies still shallower parts of the Siberian platform, on the south and southeast.

South and east of this in Siberia and adjacent Mongolia is a greatly folded, metamorphosed Paleozoic complex, with practically no folding in later Mesozoic beds; Weller designates southeastern Mongolia as a shield region, Gobia. In western Siberia are the West Siberian lowlands with the greatest depths of basin in a strip on the east flank of the Ural Mountains uplift, forming the Turgai-Ob River depression; farther east as part of these lowlands are the upper Irtysh and Ob River and the Yenisei River depressions. South of these is the Karaganda block or Kirghiz Steppe region, the west part of the south Siberian old Paleozoic complex.

Still farther on the south follow two important synclines: (1) the Chu River (Moyun Kum) basin bounded on north by the Char Tau Mountains and separated from the Kazakh (Kysyl Kum) basin by the Kara Tau Mountains and (2) the Kazakh syncline bounded on the south by the Hissar Mountains. Farther southwest are the several uplifts and basins of the Caspian province previously described.

In northeastern Siberia is the semi-circular uplift of the Verkhnoyansk-Kolyma-Anadyr Mountains which on its south borders a group of included basins, the deepest of which is the most westerly or Yana River syncline. This region is south of, and was pushed southward by, the East Siberian Sea shield. The Yana syncline also rims the Anabar shield. Still another basin east of the Anadyr Mountains, the Anadyr syncline has heavy Cretaceous deposits. South and east of the Stanavoi Mountains, north of Kharbarovsk, is the narrow Amur basin, probably the south extension of the Yana syncline. East of the Anadyr syncline in Kamchatka lie the Karaksky and Srediny Mountains, and east of these is a region of Alpine folding in Cretaceous and Tertiary beds, the southeast extension of which is formed by the Kuril Islands; similar conditions occur on the east and west

flank of the Paleozoic core of Sakhalin Island, which is an extension of the West Pacific arcuate belt which includes the Japanese islands.

In summation, there are two great shield areas, the Fenno-Scandia shield, Voronezh block, and Podolian block on the west, and on the east the Kara shield, the Anabar-Yenisei horst-Angara shield, the Gobia shield, and the Tarim shield, while between are the great mobile basins of Russia and West Siberia, of the Lower Danube and the Caucasus region; on the south in Bulgaria, Turkey, and Iran is a great median mass, which also helps to bound and contain the mobile area, just described. This mobile region is the great oil-reserve area of Russia; east of the Anabar shield and south of the East Siberian-Chuchoe seas shield is another mobile region, smaller and of less oil-productive significance.

OIL PROVINCES

The map and areal classification table present the results of this study. They give categories of provinces as to U.S.S.R. oil potentials: Primary, Secondary, Tertiary, Possible, and Doubtful. In Primary are included only those where large production is probable and depth and character of sediments warrant. In Secondary are included areas which also have considerable thickness of marine sediments so that material production appears fairly sure. In Tertiary are included some producing areas and others that will produce but thickness of marine sediments and other conditions make extent of production probably of a considerably lower order. In fourth or Possible category are placed those where conditions are generally less favorable or the geologic information is such that a higher classification is not warranted at present; there are at least two areas included in this category on the map and one of the fifth (Doubtful) category that might well belong to the third category; these three are the Yana basin, part of the Anadyr syncline of West Kamchatka, and the Ishim basin (shown in Doubtful category on the map), totalling 216,103 square miles. In the fifth category are basinal areas which, though containing seepages and structures, are of doubtful possibility for commercial oil, and do not now warrant attempts at development, especially with the large amount of more favorable territory available.

While in the attached table, land and under-water areas (water to 200 meters depth) are given separately for each district, from a practical viewpoint, they are classed in this discussion as one; there is an added development-cost increment for the under-water areas.

NORTH RUSSIAN PROVINCE

(1) *Moscow basin*.—This basin has little depth of unmetamorphosed sedimentaries excepting in its southeastern part, where two anticlinal folds appear, while a third occurs north of Yaroslavl. One gas field has been opened west of Penza. The Devonian and Carboniferous beds extend westward as overlaps on the Fenno-Scandia shield. It is in these overlaps, and particularly against closure where it is present on the larger folds where the Devonian thins, that stratigraph-

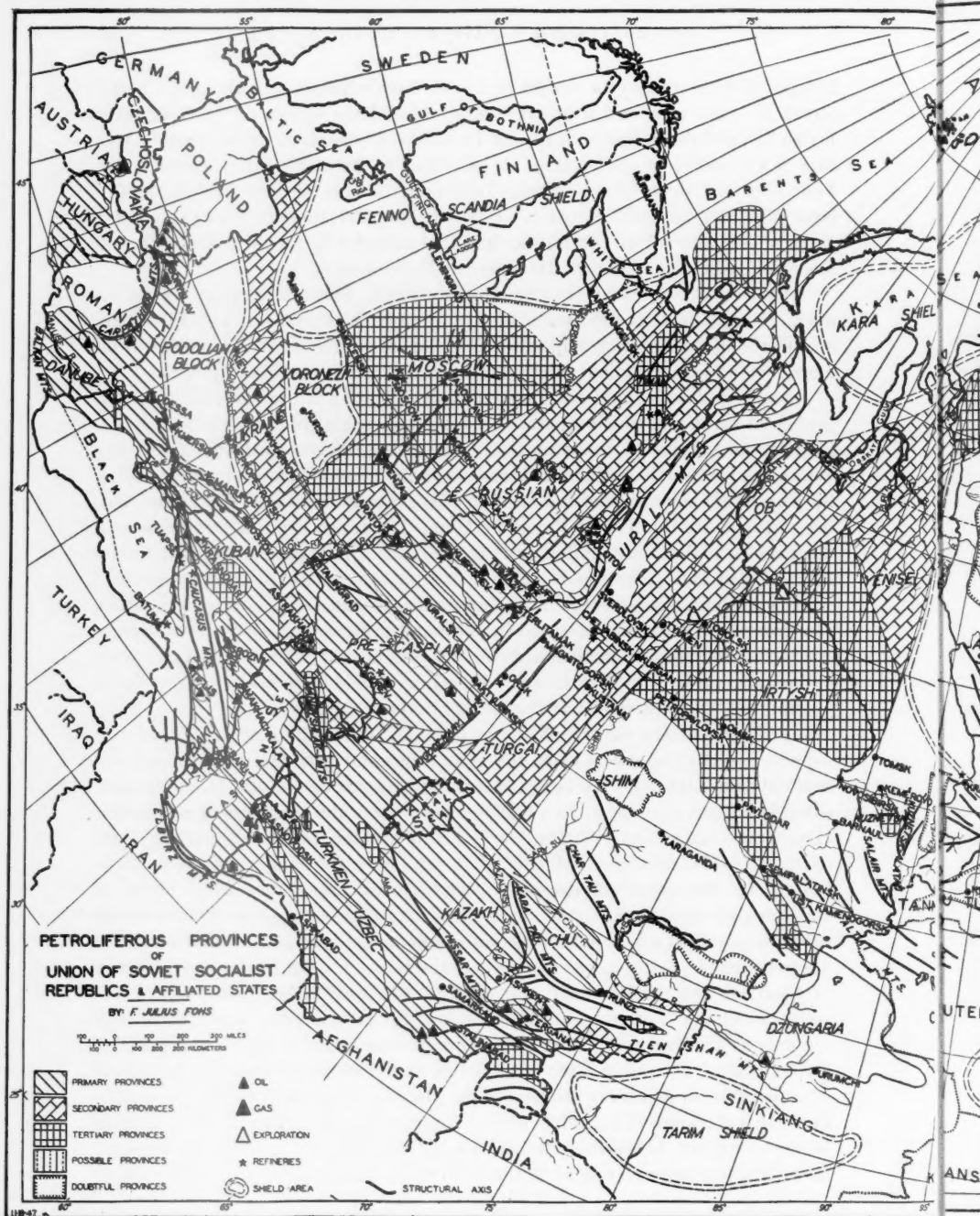
ic-type oil deposits may be sought in Lower Carboniferous and Devonian beds. North of a line eastward from the south end of Lake Onega to the Svermaya Dvina River (broken line on map) the Devono-Carboniferous section may be too thin to be worthy of prospecting, as, according to Bubnoff's interpretation, the Fenno-Scandia shield and Cambrian beds underlie this area at shallow depth; later Russian maps give, however, a different interpretation. This area should be given a low value for oil possibilities and it is excluded in the areal estimate. Oil has recently been found in the Devonian at Kasmokamsk.

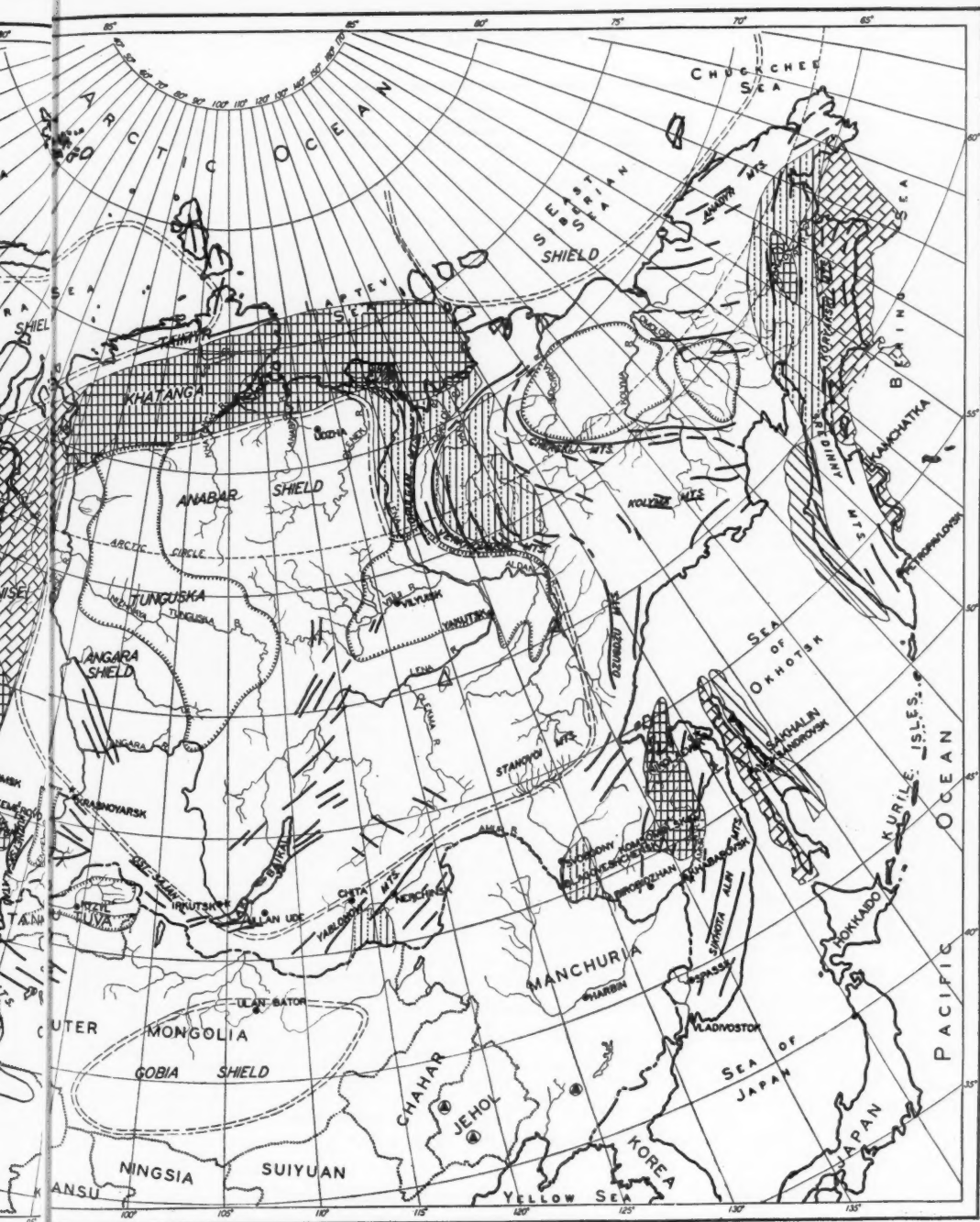
The thickness of beds in the Moscow basin, Silurian through Tertiary, averages 3,460 feet; the thickness of Cambrian beds is 510 feet. The Devonian and Carboniferous section important from an oil standpoint has a thickness of 2,000 feet, and the Permian, chiefly continental in facies, averages 350 feet.

(2 and 3) *Timan range and Pechora basin.*—The Timan range is a northwest branch of the Urals which separates the Moscow basin from the Pechora basin bounded on the east by the main Urals. The range extends northwest across the White Sea just north of Murmansk and skirts the Fenno-Scandia shield. It thereby permits the extension of the Pechora basin into Barents Sea. Production has been opened on the Timan Range at Ukta. The range exposes Devonian and older rocks, so that only limited parts of the range will be productive, and due to lack of cover only 5,000 square miles of its total area is suitable for prospecting.

The Pechora basin has Permian, Carboniferous, and Devonian rocks; production from the Devonian is assured by oil found at Severokamsk in the northern Urals. Bubnoff places a small shield area just east of the river's mouth. Folds near and paralleling both the Timan and Ural ranges should be found with production possibilities. Oil is produced at Perm and in other localities.

(4) *East Russian basin.*—With its Permian, Carboniferous, and Devonian (upper, middle, and lower) beds, this is an important petroliferous province. Its best developed oil fields are in the vicinity of Molotov and south. Its southward extension which is mapped as a primary area where the thickness of sediments, about 5,000–9,600 feet into the Devonian, is greater, includes the Kuibyshev (Samara) fields. Also, the finding of oil in the Lower Carboniferous and particularly in the Devonian limestone has been of prime importance and a factor in supplying much needed production in the last 1½ years of the war. This included the Tuimazy field which is an anticline 30 kilometers long and may cover a productive area of 75,000–90,000 acres where the Lower Carboniferous production is at 5,500 feet and the Devonian at 9,600 feet. The middle Devonian porous limestone (which does not crop out in the Urals at the east) has developed production not only at Tuimazy but also at Molotov on the north and in the Samara bend at Yablonovog at a depth of 8,500 feet. The greater thickness of Permian deposition is responsible for greater depth than in the Moscow basin. Marshall Kay gives the Permian a thickness of 4,545 feet east of Kungur, though farther north at Kizel it is only 2,575 feet. This is comparable with the thickness of 350 feet in the Moscow basin. The average covering of Mesozoic-Tertiary beds is 1,400 feet and there is at





I. AREAL CLASSIFICATION OF PROMISING OIL PROVINCES AND DISTRICTS OF U.S.S.R.

	PRIMARY		SECONDARY		TERTIARY		POSSIBLE	
	Square Miles Land	Water	Square Miles Land	Water	Square Miles Land	Water	Square Miles Land	Water
1. NORTH RUSSIAN PROVINCE								
(1) Moscow basin (less north part)					250,000			
(2) Timan range					20,591*			
(3) Pechora basin and Barents Sea			101,685	21,162		57,388		
(4) East Russian basin	124,641		240,315					
(a) Saratov region			37,661					
(b) Sterlitamak region			11,657					
Total—East Russian, Pechora and Barents	124,641		391,318	21,162	270,591	57,388		
2. SOUTH RUSSIAN PROVINCE								
(1) Ukrainian basin			157,819					
(2) Pre-Caspian (Emba-Astrakhan) basin	195,480	18,472	25,107					
(3) Kazakh basin	230,100	20,542			1,793			
(4) Ferghana basin	22,417							
(5) Chu River basin	43,938							
Total—South Russian 1 to 5	498,025	45,014	182,926		1,793			
(a) East Ferghana basin			14,347		3,138			
(b) Lake Issyk-Kyl basin								
(c) South Ferghana (Sary Tash and Bartang rivers)					15,871			
3. CASPIAN-BLACK SEA PROVINCE								
—Trans-Caucasian basin—								
(1) Kuban (Northeast Caucasus) basin	84,289	27,797			13,450			
(2) Crimea-Sea of Azov	0,456	15,960			2,241	2,690		
(3) North Black Sea		16,140				2,152		
(4) Bessarabian (Moldavian) basin	30,308				717			
(5) Turkmen-Uzbek basin	224,175	24,211			27,977			
Total—Trans-Caucasus	345,228	84,108			44,385	4,842		
—South Caucasian basin—								
(1) Baku (Kura River) basin	20,265	10,222						
(2) Nebit-Dag basin	17,934	19,727						
(3) Black Sea basin	4,752				1,614			
Total—South Caucasus	42,951	29,949			1,614			
4. WEST SIBERIAN PROVINCE								
(1) Turgai-Ob depression			443,866					
(2) Irtysh River basin					373,030			
(3) Yenisei River depression			95,046					
Total—West Siberian 1, 2, 3			539,812		373,030			
(4) Karaganda block							23,314	
(a) Ishim basin					6,725			
(b) Kuznetsk basin								
(c) Ili River basin			8,070					
Total—Karaganda			8,070		6,725		23,314	
5. NORTH-CENTRAL SIBERIA PROVINCE								
(1) Khatanga River basin					179,340	118,364		
(2) Lower Lena basin							64,562	
Total—North-Central Siberia					179,340	118,364	64,562	
6. NORTHEAST SIBERIA PROVINCE								
(1) Yana River basin							83,393	
(2) Anadyr basin					10,760		111,190	21,520
(3) Southwest Kamchatka	17,934	33,177						
(4) East Kamchatka			60,347	77,295				
Total—Northeast Siberia	17,934	33,177	60,347	77,295	10,760		194,583	21,520
7. FAR EASTERN PROVINCE								
(1) Amur basin					44,835	6,276		
(2) East Sakhalin	4,483	22,417						
(3) West Sakhalin			9,594	10,939				
(4) Blagovoshchensk							16,140	
(5) South of Chita							11,657	
Grand total, all provinces	1,033,262	214,665	1,206,414	100,396	936,591	186,870	310,256	21,520

* An area of only 5,000 square miles has enough cover to prospect.

II. AREAL CLASSIFICATION OF PROMISING OIL PROVINCES IN AFFILIATED STATES

	HUNGARIAN BASIN	BESSARABIAN BASIN	DANUBIAN BASIN	
	<i>Primary Square Miles Land</i>	<i>Primary Square Miles Land</i>	<i>Primary Square Miles Land</i>	<i>Tertiary Square Miles Land</i>
Hungary	35,868			
Austria	2,241			
Yugoslavia	9,863			
Roumania	5,380		47,076	896
Roumania Black Sea water			10,401	
Czechoslovakia	896	89		
Poland		7,263		
Bulgaria			10,491	
	54,248	7,352	67,968	896

Affiliated states total—130,464 square miles.

least 1,000 feet of Permian; under this there is 1,100–1,600 feet of Carboniferous. The upper Silurian may underlie most of this basin. The Carboniferous and Devonian may be thicker than indicated. Our only check is depth of Devonian production at Tuimazy, 9,600 feet. Already several good fields are producing, and many more should ultimately dot this region. This area has many similarities with the West Texas basin. The production due to the recent development of Devonian oil is greatly increased but is still only 20 per cent of that from the Baku fields, although no recent figures have been published; a statement suggesting an increase of 400 per cent from 1940 to 1944 makes it seem probable that it may yield 36 per cent of all production by 1950; the Russians call it "Second Baku."

The Saratov area is closely related to the Samara Bend fields. The Sterlitamak district probably has less thickness of sediments.

SOUTH RUSSIAN PROVINCE

(1) *Ukrainian (South Russian) basin*.—This is a long narrow northwest-southeast graben-type syncline extending westward from Stalingrad through Kharkov to the new Polish border. In this region only minor oil and gas fields occur, with productive salt domes at Lubny and Romney; the large gas field on a long north-south anticline, just east of Saratov, is closely related to the Kuibyshev fields.

(2) *Pre-Caspian (Emba-Astrakan) basin*.—This may well be proved the third or fourth most productive area. Its Jurassic, Permian, Carboniferous, and Devonian beds should all produce. It consists of two principal parts, the northern which contains three large arch folds and the southern which contains salt domes, salt anticlines, and a number of anticlines parallel with the Urals and their southwest extension. Wells opened are principally in Jurassic beds to depths of 2,200 feet. In the western or Astrakan part, gas has been developed. Deeper drilling is generally essential.

(3, 4, and 5) *Kazakh, Ferghana, and Chu River basins*.—Southeast of the Emba district and extending southwest from the Urals is a narrow strip which

may be uplifted or of older rocks bordering the basin and extending southwest to the Mangyslak Mountains. This strip is shown as a second-grade area with Cretaceous and deeper beds. The present study rejects Brod's interpretation of correlating this zone across the Kuban area into the Crimean-Black Sea uplift. Due south from the Urals are the Mugodzhary Mountains, of which there is a buried counterpart in the west part of the Aral Sea and underlying also the east side of the Ust-Ort Plateau. This buried uplift (formerly considered a shield area) probably dies out against, or bends southwest *en échelon* with, the Mangyslak-Hissar Mountains uplift which forms the south boundary of the Kazakh basin.

From the narrow strip, which is the southeast boundary of the Emba area, the Kazakh basin extends eastward broken only by the Mugodzhary uplift, and although covered with Tertiary and Cretaceous rocks, it is primarily similar to, but not as deep as, that of the Emba. The Ferghana Valley is the extreme east extension of the Kazakh (Kysyl Kum) basin. It is a prolific producer from a considerable number of oil pools though it is a small inter-montane basin. Production in Ferghana has been from the Eocene but Jurassic and Cretaceous will doubtless also produce, although the folds nearest Cretaceous hills have not shown anything. There has been no production reported from the main Kazakh district, though its area is both large and promising for a primary producing territory.

North of Kazakh and separated from it by the Kara Tau Mountains is the Chu River (Moyun Kum) basin which is bounded on the north by the Karaganda block. Of the old Paleozoic rocks, this region is probably less deep than the Kazakh basin and its main possibilities probably are in the Permo-Carboniferous and Devonian beds. The Turgai depression adjoins it on the northwest. The only production thus far opened is at Frunze in the extreme east corner.

(6) *Inter-Montane basins east of Ferghana*

(a) *East Ferghana*.—This is located just southeast of the Ferghana Valley. As it has Triassic at the surface with Carboniferous and Devonian beds below, it has possibilities.

(b) On the north is *Lake Issyk Kyl*, a small basin with Paleozoic and Triassic at the surface. This is southeast of Frunze, and has possibilities.

(c) Farther south of East Ferghana are the inter-montane basins of the *Sary Tash and Bartang rivers* with Paleozoic rocks and some Triassic and Jurassic, which also may have possibilities. These are immediately west of the Tarim shield area of Sinkiang province, China. This old shield area probably has only a thin cover of unmetamorphosed sediments, and is of little if any value as prospective oil area.

CASPIAN-BLACK SEA PROVINCE (TRANS-CAUCASIAN BASIN)

(1) *Kuban (Northeast Caucasus) basin*.—This Trans-Caucasus region dips north off the Caucasus Mountains and is limited on the north by the west-buried continuation of the Mangyslak Mountain uplift. Its greatest thickness of Tertiary (Pliocene through Eocene), sediments is in the Caspian just off Daghestan

and adjacent to the Apsheon Peninsula, where they reach an estimated thickness of 13,900 feet with a thinned Pliocene, but greater Miocene, while in the Tersky-Sunja region, the sedimentary thickness is 11,400 feet. Principally tested to date are the upper 2,000 feet of Pliocene beds, though the upper and middle Miocene have better reservoir beds. As in South Caucasus, the Jurassic and Cretaceous beds also underlie this region; hence, the maximum thickness of strata is at least 25,000 feet for a considerable part of this basin.

There extends northeast from the Caucasus Mountains in the region between Krasnodar and Grozny a raised shield area with a thin covering of later rocks which for this reason is mapped third grade.

In the northwest, in the deepest part of the Kuban geosyncline, lies the Donets basin, one of the principal sources of Soviet coal. It is a closely folded basin with Devonian beds appearing on top of part of the anticlines and a heavy thickness of Carboniferous and overlying beds in the intervening narrow synclines. This is rather fully described by Bubnoff. The section is: Cretaceous-Jurassic, 2,440 feet; the Carboniferous formations reported from 16,160 to 32,340 feet, though part of this thickness may be exaggerated due to tilting of beds; and Devonian, 330 feet. Where the Devonian has ample cover and closure on the anticlines, it may yield oil. The Carboniferous section is probably too important for producing coal, or for the making of producer gas from the coal beds in place.

Principal oil production thus far has been from a stratigraphic trap at Maikop, from anticlinal structures at Grozny, and from Daghestan; gas has also been produced from the last. At Daghestan, a great many anticlines and domes have been mapped and the Caspian off-shore area should contain others with some very rich oil pools; in the same trend toward the south, an oil field was opened in 1946 in the sea about $4\frac{1}{2}$ miles east of Baku.

(2) *Crimea-Sea of Azov*.—On the west are the Sea of Azov and Crimea, continuation of Kuban. Most of the Azov area should be exploitable. In Crimea, a number of fields have been opened; part of these belong to the North Crimean-Kuban basin, part to the Caucasus axis, with oil principally on the north in the former, and gas with some oil in the Caucasus extension on the south. These fields have not been proved as good as those farther east where the basin is wider. This part of the basin is limited by the Podolian block on the north, as is the Black Sea continuation of the Crimean basin.

(3 and 4) *North Black Sea and Bessarabian basin*.—The Black Sea part of this basin while sizable and wider remains as yet unexplored; this part joins the Bessarabian (Moldavian) basin on the west, and is north of the uplift shown on the map as a second-grade belt extending into Dobrudja. Farther northwest, the Bessarabian basin has the former narrow Polish sub-Carpathian basin as its extreme west extension; this narrow basin is also bounded by the Podolian block on the northeast. The oil fields at Boryslav are now principally within the new Russian boundary as the map and areal classification table show. The region between Boryslav and Odessa remains almost wholly unexplored.

(5) *Turkmen-Uzbek basin*.—This great basin is the Trans-Caspian extension of the Kuban-Daghestan syncline. It is bounded on the south by the Kopet Dag, part of the Altaids, and on the north by Mangyslak-Hissar Mountains axis. Just north of Krasnovodsk are some minor uplifts, probably northwest branches from the Kopet Dag Mountains. No production has been reported, excepting the Termez fields in Uzbek at the extreme east. This, like all Trans-Caspian basins, is covered with recent beds and considerable geophysical exploration is necessary for mapping the buried structures. Here is found a large and important off-shore Caspian Sea area. The geologic section should be proved very similar to that of the Kuban, and ultimately the production from this area, because of size and other favorable conditions, should be as great as, or greater than, any yet explored in Soviet Russia.

The Mangyslak Mountains and *échelons* at the north and Kopet Dag and its offshoots are all rated as oil-explorable areas with Cretaceous and deeper beds, as their flanks may be important for oil possibilities, and buried sections equally so.

The Kuban basin includes part of the Kerch Peninsula; the remainder belongs with the Batum-West Georgia area at the south. Here in the north Sub-Caucasus twenty-seven structures have been reported, but only a few are thus far productive. The Maikop field—stratigraphic in type—has chiefly Miocene and Oligocene beds, with a thickness on the west of 3,350 feet and on the east of 5,000 feet. Much of Maikop was ruined in the war. The Grozny oil fields, at the east, were heavily drawn on. Greater depth of exploration of some of these structures, as well as farther north from the mountain axis, where the section greatly thickens, should get results.

CASPIAN-BLACK SEA PROVINCE (SOUTH CAUCASIAN BASIN)

(1) *Baku (Kura River) basin*.—The southeast Caucasus Valley, inclusive of the Apsheron Peninsula, is the most important oil district of U.S.S.R. from the standpoint of (a) thickness and marine character of strata, (b) large number of structures already mapped, and (c) number of producing zones, known and possible. The Apsheron Peninsula strictly interpreted belongs, partly also, to the Kuban-Daghestan area. The total thickness of sediments of this region at its deepest part based on known thicknesses of exposed formations in the southeast Caucasus Mountains and in wells aggregates 29,700 feet with a range according to Goubkin, as follows: Pleistocene 136 meters, Pliocene 2,306, Miocene 1,171, Oligocene 730, Eocene 600, Upper Cretaceous 1,675, Lower Cretaceous 1,025, and Jurassic 1,370 meters. There is a fair chance of finding oil in all but the first and last formations though in the past it has come principally from Pliocene beds.

This region is bounded on the north by the Caucasus Mountains and on the south by the northwest extension of the Elburz Mountains. It narrows and thins toward the northwest, west of Tiflis. While production is thus far principally from Pliocene beds, as one approaches the edges of the basin, lower beds come within reach of the drill and with proper traps will produce through the Creta-

ceous. Several hundred structures have been mapped both on land and in the Caspian off-shore areas, and most of these should ultimately produce. From these fields has come most of the Russian oil, and though production at present is less than it was before World War II, it should eventually become larger.

As is the case in Apsheron, on the Taman Peninsula, the lower Kura Valley and, likewise, in South Georgia in the upper Kura Valley, only a few of the known structures have been developed.

(2) *Nebit Dag basin*.—Inclusive of an off-shore Caspian Sea area, this is the southeast, Trans-Caspian extension of the Baku-Southeast Caucasus basin. It differs chiefly in that the Pliocene beds are thinned on the land area and are principally a red facies with a less productive zone. The underlying Miocene should yield the principal production. The remaining stratigraphic section should be similar to that of the Southeast Caucasus. Large oil wells have produced at Nebit Dag, Chikishlyar, on Chelekin Island, and at Neftedag. Off-shore in the sea, larger Pliocene production may also appear. Here the Elburz Mountains occur on the south and the Kopet Dag Mountains on the north. The land area is somewhat less, but the land-sea area is greater than that of the Southeast Caucasus; because of thinner Pliocene, the area though primary, should have a somewhat lower reserve rating. The amount of drilling and exploration has been much less, but when fully developed the area should produce much oil.

(3) *Black Sea basin*.—The Kura River valley heads in the vicinity of Tiflis in the South Caucasus. Farther west in West Georgia, the continuation of this basin enters the Black Sea, reaching it at Batum and Tuapse; this may be designated the West Georgia wedge. It is the east corner of a very large basin, the major part of which is in the Black Sea, but which is in fact the east three-fourths of the Danubian basin of Roumania and Bulgaria. On this border, the 200-meter depth of water is reached close to shore, so that very little off-shore area is available. However, on the Dobrudja shore, off the Danubian basin, a large area occurs at drilling depth off-shore entirely untested. According to a recent report, this Dobrudja area is said to have been ceded by both Roumania and Bulgaria to the U.S.S.R. (evidently acquired for security reasons). While nothing is known directly of the stratigraphic section, the main part of this basin must have a considerably greater thickness of Tertiary beds, especially of Pliocene and Miocene, than in the west sub-Carpathian section of the Danubian basin where the present Roumanian oil fields are located.

The stratigraphic section in the West Georgia wedge region is very similar to that in the Maikop area, but, being more basinal, the Tertiary section is greater and it should be underlain by a greater thickness of Jurassic and Cretaceous beds. Deeper drilling would doubtless uncover considerable productive oil, both in this region and in the entire east Kerch Peninsula at the north and west. Only a small amount of oil has been produced thus far and the ultimate reserves may not be large.

(4) *Danubian basin and Sub-Carpathians*.—It is necessary to point out the

salient points of this region, for though it is outside Russia, nevertheless Bessarabia and Polish Galicia, both in Russia, are part of it and if, as recently reported, Dobrudja is ceded to the Soviets, the eastern land strip of this basin at the mouth of the Danube and the off-shore area in the Black Sea are important for future oil development. The general geology and oil geology of the Roumanian and Polish Galician oil fields have been fully described by others (see bibliography). They represent primarily folds and overturned folds and diaper salt anticlines which have already produced much oil. These fields rim the Carpathians on the east from Boryslav through Bacau to Ploesti. Toward the end of the last war a salt dome was found productive somewhat farther east in the west edge of the plain. Salt domes should be found over most of the lower Danubian plain and its Black Sea off-shore extension. In Bulgaria, at the south end of the plain, there may be folds paralleling and north of the Balkan mountain range. In Bessarabia, folds along the extension of the Caucasian axis may be sought, and on the northeast other possibilities are present. The essential point is that the greater part of the Danubian basin remains untested, and the decrease in production due to war damage and excessive use of the older fields can best be remedied by new and deep exploration of the plain.

According to Ray P. Walters, 98.5 per cent of Roumanian production has come from the Ploesti or southernmost of the Roumanian fields. The big production in Polish Galicia has come from Boryslav, which has the largest of the Galician reserves. For stratigraphic sections and further details of this basin as well as the Hungarian basin, reference may be made to Walters' paper, "Oil Fields of Carpathian Region."

WEST SIBERIAN PROVINCE

This province may be subdivided into the West Siberian lowlands consisting of three related basins and the Karaganda block with some minor basins.

(1) *Turgai-Ob depression*.—This should be an important petroliferous province. There should be folds adjacent to and paralleling the Urals, with cross-folding effects extending northwest from the several fold axes of the older complex on the southeast.

(2) *Irtys River basin and Upper Ob River extension*.—The southwest part of this depression is probably a continuation of the syncline showing in the Karaganda block on the south, but deeper and with greater thickness of sediments than in the remainder of the region. At Gankino, a test well had showings of oil and gas at 770-900 meters. It is possible that the higher plateau region exposed on the southeast may to some extent be represented under the region between the Irtys and Upper Ob River though covered by the Jurassic sediments. This region generally is given a third-class rating.

(3) *Yenisei River depression*.—This represents a northwest syncline west of the Yenisei River, probably of some importance with folds paralleling the lower Yenisei and Angara uplifted blocks (Cambrian). The region southeast to

Krasnoyarsk is here excluded, though this interpretation may be wrong, since the area east of the 90° meridian may be basinal instead of a covered part of the Yenisei horst; only geophysical studies can decide.

The Turgai-Ob depression should have the greatest thickness of sediments. Together with the remainder of the West Siberian lowlands, it has a Paleozoic base, but on top of this perhaps Cretaceous, certainly Triassic, and Jurassic beds have been deposited; as a foredeep of the Urals, it should be a depression of some depth. No worthwhile prospecting has been done, though one borehole has shown a depth of 500 meters through the Jurassic-Cretaceous beds in the Turgai.

Little or no folding is reported in this region since the close of the Paleozoic so that the Jurassic-Cretaceous beds generally in the lowlands are probably structureless. This unconformable cover of 500-1,000 meters will require geophysical studies to locate the deeper Paleozoic folds. Accumulations are probable in beds ranging from the Carboniferous to the Ordovician.

(4) *Karaganda block*

(a) *Ishim basin*.—This small coal basin (Lake Tengiz), with Carboniferous and Triassic rocks and some intrusives, may have possibilities worthy of exploration in the Lower Carboniferous, Devonian, and Silurian strata. This is the region of the Upper Ishim River valley and lies west of Akmolinsk. It is a depression in the main Karaganda folded region.

The Balkash Sea, a part of the Karaganda block, is a large basin filled with flysch from the rocks of the Kirghiz Steppes and surrounding mountains and is underlaid principally with Silurian beds. It is of doubtful significance for oil prospecting.

(b) *Kuznetsk basin*.—This important coal basin covers a small area in the Paleozoic complex south of Tomsk. While some prospecting has been done, and oil and asphalt showings obtained, no commercial oil has been reported. Anticlinal structure occurs and doubtless deeper drilling to the Devonian and Silurian may be more fruitful.

Minusinsk is a small basin east of the Kuznetsk but is shallower and much less promising for oil, though it is coal-bearing, and is underlaid at shallow depths with Silurian and Cambrian. An adjoining small basin at the north is still less favorable, and the Ust-Kamenkorsk basin at the south, while larger, is likewise unfavorable.

(c) *Ili River basin*.—This is in the extreme southeast corner of the Karaganda block. It has a Quaternary cover over Paleozoic rocks with intrusives and probably is of little importance. It is just west of the Urumchi (Tihwa) region of northern Sinkiang province, China; in the southwest part of this basin, twenty-five oil wells were drilled by the Soviets, which at the end of the war were turned over to the local authorities. The size of this production is not large. Although China has been studied by J. Marvin Weller, not much is known of the possibilities of this basin; this is outside Soviet territory but its proximity made reference here desirable. This basin is bounded on the south by the Tien Shan range.

NORTH-CENTRAL SIBERIA PROVINCE

(1) *Khatanga River basin*.—Between the Kara Sea and Anabar-Angara shields is the Khatanga River (Taimyr) depression. This is a wide graben-type basin, rimming both the north and south shield areas. It is also a continuation of the Ob basin, which is on its southwest; on the east it becomes one with the extreme Lower Lena and Yana River basins which rim the Anabar shield on the east.

The Khatanga area has been drilled only in the vicinities of Ust Port where a slight oil showing was found near the mouth of the Yenisei River, and in the delta of the Khatanga River near Cape Nordvik. Aside from Quaternary cover, the beds are principally Jurassic, Cretaceous, Tungusian (Carboniferous), and Devonian, with some probability of being also underlain with Silurian, Ordovician, and Cambrian. The sections that can be estimated from drilling and from outcrops are not good, partly because the drilling was done on salt domes near Cape Nordvik, and partly near Ust Port where the depths were inadequate. It is possible to give what may be considered minimum thickness of strata for this basin from top of Devonian through Cretaceous with the approximate section as follows: Cretaceous sandstones, slate, and sands, as thick as 2,310 feet; Jurassic clays and sandstone, 2,145 feet; Tungusian estimated, 1,320 feet; Devonian limestone and dolomite; and rock salt with anhydrite which may be Silurian or Cambrian.

In the vicinity of Ust Port, an asymmetric anticline has been mapped and at Cape Nordvik, several salt domes have been partly explored.

This region has been given a third-class rating since conditions favor oil being found when adequate testing is done; neither sufficient tests have been made nor have they been drilled deep enough on the salt domes, and of course, other tests at the southwest have been very few, and some of these were so far south of Ust-Port as to be outside the basin.

(2) *Siberian platform*

(a) *Tunguska River basin*.—This is a shallow but large basin in the west half of the central Siberian massive, lying between the Anabar and Angara shields, and bounded on the northwest by the Yenisei horst block. It has Permo-Carboniferous rocks at the surface, mostly interpenetrated with intrusives and is the second largest coal-reserve basin of the U.S.S.R., with coal from the Lower Carboniferous. The character of the Permian and Carboniferous strata makes them improbable source beds; this and the presence of the intrusives do not encourage oil prospecting, but since much of this basin is underlain with Silurian limestones, it can not be entirely eliminated as prospective territory.

(b) *Upper Lena and Aldan Rivers region*.—This, inclusive of the Vilui and Tolba tributaries of the Upper Lena, is part of the Upper Lena River basin, a shallow depression in the south half of Anabar shield-Cambrian-Silurian area. The region has been prospected for oil by Soviet geologists and some asphalt indications were found particularly in Cambrian rocks; also, evidences of Cambrian

salt beds. While mild folding occurs in the Vilui region, and also on the Tolba branch of the Lena River just east of Olekina branch, and a small amount of oil and asphalt occurs also at the southeast on the Aldan River, the region lacks ample cover to warrant further prospecting. In basins, where amply buried, these showings may point to possible Cambrian production, but because of the great age of the beds, possibilities are limited. A small production is reported from Maiya, east of Yakutsk.

(3) *Lower Lena River basin*.—A narrow basin between the Anabar shield and the Orulgan-Verkhoyansk Mountains has principally Jurassic and some Triassic beds, and these in turn are underlain probably with Silurian and Cambrian beds. The basin is here rated as fourth class, chiefly because its folds may contain Silurian and less possibly middle Cambrian oil. This has heavier cover than the Vilui region at the south; hence, it is more likely territory, yet not good enough to be rated as third class, according to a recent report, oil has been discovered and produced near the mouth of the river.

NORTHEAST SIBERIA PROVINCE

(1) *Yana River basin*.—Though classed as fourth grade on the map, because the geology is still too little known, it probably should be included with areas of possible oil. Certain facts stand out: (a) this syncline lies between the Orulgan-Verkhoyansk Mountains, back of which is the Anabar massive on the west and the Cherski Mountains on the east, (b) the rocks are principally Cretaceous, both upper and lower, in part marine, with a cover of upper Triassic and both upper and marine Jurassic, (c) there is ample folding of Mesozoic age, (d) the area has greater thickness of strata than the Indigirka-Kolyma area on the east.

Indigirka River, Kolyma River, and Omolon River basins.—North of the Cherski Mountains which are north of the Verkhoyansk-Kolyma chain, are two basinal areas in which little is known of the geology because of ice and Quaternary covering. The presence of Silurian outcrops and granitic intrusives is ample evidence, however, even though affected by Mesozoic folding, to class these areas as unpromising.

In the same category belong the Quaternary-granitic outcrops at the north, fringing the East Siberian Sea. This is part of an apron-like area south of the East Siberian-Chukchee Seas shield, which consists of older Paleozoic rocks and was subject to Middle Paleozoic (Variscan) folding.

(2) *Anadyr basin*.—This large syncline between the Anadyr Mountains and the Koryaksk-Srednyy Mountains thus separating the mainland from part of the Kamchatka Peninsula, is primarily a Cretaceous region subjected to post-Cretaceous folding and containing 14,000 feet of sediments, consisting of tuffs, sandstones, argillaceous sandstones, and clays, with heavy volcanic intrusions; it is graded fourth class, because of these intrusions and because we know nothing of its exploration; a small central core shown free of intrusions is graded as third class, though undoubtedly with this thickness of sediments much of the basin

may rate equally high. It lies just south of the Paleozoic beds bordering the East Siberian-Chukchee Seas shield.

(3) *Southwest Kamchatka*.—Off the west flank of the Sredniny Mountains is a long strip of Tertiary-Cretaceous, flanking and partly in the Sea of Okhotsk which deserves rating as a primary area, although no oil has yet been found. This is the southern continuation of the Anadyr basin, and is south of the 60th parallel. The two more northerly of the Kuril Islands and their offshore areas may be classified as an extension of West Kamchatka.

(4) *East Kamchatka*.—In the Koryassk Mountains and eastward into Bering Sea and on the east flank of the Sredniny Mountains north of Petropavlovsk is a region subjected to Tertiary (Alpine) folding, which has a number of prospects, and is entitled to rating as a second-class area. It covers a considerable region, though most of it is above the 60° parallel. There are Tertiary and Upper Cretaceous strata. High volcanic mountains define this area on the west.

FAR EASTERN PROVINCE

(1) *Amur basin*.—In the Amur province, is a narrow syncline plunging north-northeast between the Sikota Alin Mountains on the east and the Stanovoi Mountains on the northwest. Here Devonian beds reach the surface on the south but on the north first Permo-Carboniferous and then Triassic and Jurassic cover appears, together with some granitic intrusions, so that Carboniferous and more probably Devonian beds may serve as reservoir rock. This may be a southward continuation of the Yana River basin.

(2 and 3) *Sakhalin Island*.—The recent article by Leo W. Stach gives an excellent statement of the conditions in both North and South Sakhalin. In eastern North Sakhalin three producing fields have yielded about 34,500,000 barrels of oil to the end of 1939; the amount of recent production is not known. For thirteen fields, Stach estimates 3,133 acres with proved reserves of 370,000,000 barrels. This is from a length of 250 miles, mostly from a 12-mile strip on the east flank of the island, from an anticline 150 miles long, with a series of high structure developed thus far only in the Pliocene and with the deepest well about 3,500 feet. The oil is produced from the upper part of a Neocene sequence of 30,000 feet in thickness. It is most probable that other zones will be opened with depth, which will add greatly to the estimated reserves. There is little reason to doubt that exploration should show other productive fields under the sea on the continental shelf at the east within the 200-meter limit. Development was principally by the Japanese, but it has now been taken over by the Soviets.

The backbone of the island is an old Paleozoic complex. West of this complex is a Cretaceous and Tertiary belt. East of the backbone is the Neocene belt with its Alpine folds.

Tests have been drilled by the Japanese on the west side of South Sakhalin, ranging in depth from 650 to 5,275 feet. No commercial oil has been developed although there have been showings in the Neocene. The total thickness of Ter-

tiary formations according to Stach ranges from 11,480 to 36,080 feet. They are folded into a series of common gently *en échelon* anticlines trending from north to northwest. Gas seepages are also known in two instances from the Cretaceous. Stach believes there are potentialities worthy of further exploration. This area is here rated as second class, for both deeper drilling and drilling in the sea at the west should prove oil deposits of importance. On the east side of the island, Paleozoic rocks and granites are present, but farther east on the continental shelf, a part of the area must be underlain with Tertiary worthy of development. Sakhalin may well be proved to be a very large oil reserve.

(4) *Blagoveschensk area*.—In the upper Amur River Valley, a small fourth-grade basinal area has been hollowed out of the old Paleozoic complex. This has a Paleozoic base with a covering of Jurassic and Triassic beds, and in the south and deeper part some Cretaceous beds; there may also be igneous intrusions such as occur surrounding it. South of the Amur River are Manchuria and the Hsiaokhiang Shan Mountains.

(5) *South of Chita*.—A small basin, the extension of an east Manchurian basin, with Triassic, Jurassic, and Cretaceous, and intrusive rock at the surface, occurs upstream from Blagoveschensk on the east side of the upper Amur River. It is a small hollow carved out of the Paleozoic-granitic complex with minor possibilities.

SALT-DOME PROVINCES

Soviet Russia has at present three provinces in which salt domes occur.

(1) *Ukraine*.—In the Ukraine (South Russia) basin there are three salt domes, those of Lubni, Poltava, and Romney (only Romney and Poltava have production), and others are possible. With these, some oil and gas are associated, but they are of minor importance since this basin does not contain beds much deeper than the Devonian and though Silurian be may present, the salt may have originated in either Silurian or middle Cambrian beds.

(2) *Khatanga Bay*.—The Khatanga Bay (Cape Nordvik) region is part of the Khatanga depression. Here twelve (twenty structures reported) salt domes have been found. The salt is considered Silurian or may be middle Cambrian in age. Oil showings occur, but no oil has been found commercially productive; three of the salt domes have been outlined by test core-holes. The domes are piercement with varying amounts of cover; deeper testing to reach the Tungusian (lower Carboniferous) series is recommended, and the Silurian also warrants testing.

(3) *Emba-Astrakan district*.—This has a large number of salt domes as well as some salt anticlines. Oil is produced from both Jurassic and Permian beds and the chances favor production from the Carboniferous, Devonian, and upper Silurian limestones when sufficiently deep tests are drilled. Additional salt domes, some of them deeper-seated, may be expected in the northern Caspian Sea.

(4) *Kuban-Turkmen and Baku*.—The two basins on the south, both the Kuban-Turkmen and the Baku, may be proved to have salt domes in the at-present non-explorable deeper areas of the Caspian Sea, since the depth of cover is favor-

able to such occurrences, though this will depend on the presence of Silurian or Cambrian salt, which may be absent if this was a land area in those periods.

(5) *Vilui and Upper Lena-Aldan*.—Cambrian salt is known to occur in the Vilui and Upper Lena-Aldan region, but conditions there are not favorable to productive salt domes.

OIL PRODUCTION, RESERVES, AND ULTIMATE POSSIBILITIES

PRODUCTION

The following table gives total production to date and also for the year 1946. Regression of production due to the effects of World War II was particularly noticeable in Roumania, Russia, and Poland. In Roumania, production was 45,048,000 barrels in 1939 against estimated 32,450,000 barrels in 1946. In Soviet Russia (except Sakhalin) it was 216,886,000 barrels in 1939 against estimated 160,000,000 barrels for 1946. In Poland it was 3,900,000 barrels in 1939 against estimated 800,000 barrels in 1946; part of this great divergence is due to Soviet Russia having taken over such a large part of the Polish Galician oil fields.

PRODUCTION IN U.S.S.R. AND AFFILIATED COUNTRIES
(From 1946 Yearbook-Forecast Number (February, 1947)—*Oil Weekly*)

Inclusive Years	In Thousands of Barrels	
	Total to Date	1946
1933-1946 Albania	9,923	725
1919-1946 Czechoslovakia	3,803	188
1935-1946 Austria	34,135	4,500
1937-1946 Hungary	3,291	5,220
1857-1946 Roumania	1,130,053	32,450
1863-1946 Russia (except Sakhalin)	5,655,712	160,000
1921-1946 Sakhalin	66,240	6,000
1874-1946 Poland	277,644	860

From another source the total 1945 production of Soviet Russia, inclusive of Sakhalin, was 143,500,000 barrels—the great bulk being produced from Baku. One reason for the failure of the Second Baku to produce more was the decline at the important Ishimbaero field. According to this report almost 70 per cent still comes from Caucasus fields, and 14 per cent from the Second Baku.

United States production in 1946 was 1,731,889,000 barrels as against U.S.S.R. production of 166,000,000 barrels, inclusive of Sakhalin, which is less than one-tenth that of United States; and whereas Soviet production declined one-third since 1939, the United States production is more than a half billion barrels greater annually.

ESTIMATES OF PROVED RESERVES

Of proved oil reserves, the *World Oil* gives the total for the world at 63,187,037,000 barrels with United States 24,194,587,000 barrels and Soviet Russia 7,590,000,000 barrels, inclusive of Sakhalin. If Stach's estimate on Sakhalin of 370,000,000 barrels is used and 7,500,000 barrels for Soviet Russia, the total would be 7,870,000,000 barrels; probably this figure more nearly reflects present status than L. F. McCollum's recent figure of 5,700,000,000 barrels. For

Soviet-controlled Albania, Czechoslovakia, Hungary, Poland, and Roumania, the proved reserves would be 241,000,000-491,000,000 barrels depending on the estimate for Roumania of 150,000,000-400,000,000 barrels; most of the Roumanian estimates have been of the latter order. Logan gives 13,051,450,000 barrels as the interest in foreign oil reserves held by American companies.

The principal Soviet authority on oil reserves was I. M. Goubkin. He reported estimates in 1937, 1938 and 1939. He has classified reserves as "industrial" probably equivalent to our "proved," with two other categories of "supposed" and "possible." The 1937 report was detailed as to districts and categories, and from this we find him giving prime importance to the South Caucasus and Trans-Caucasus, allotting seven-eighths of his "industrial" to these areas. If we add the last two of his categories together and call them "speculative," we would get the following relative groupings: South Caucases first place, with Pre-Caspian and East Russian basins rated about equal and each at a little more than half that for South Caucasus. Still lower values are given the Trans-Caucasus and Sakhalin, with the other districts making up the remainder. It is probable that with the finding of deeper oil, he would now give East Russia and the Pre-Caspian a somewhat higher rating. In 1938, he raised his industrial estimates about 730,000,000 barrels to 7,194,000,000 barrels; this after Lower Carboniferous production was found at Tuimazy; his over-all estimate was about 63,146,000,000 barrels. In 1939 his estimate of "explored and visible" was 2,420,000,000 metric tons which may be translated as 17,641,800,000 barrels.

In a 1940 estimate of ultimate reserves covering the entire Soviet Union, 25 per cent was assigned to South Caucasus and Baku fields, 14 per cent to the East Russian basin, Emba basin 22 per cent, and Trans-Caucasus 19 per cent. This estimate is more conservative than that of Goubkin. It is also reported that there has been a considerable increase above the figures then given as a result of developments during the war years. Goubkin's total figures for speculative possibilities are not out of line.

The most optimistic of any of our American estimates has been 8,500,000,000 barrels proved.

Gas is reported both in separate reservoirs and accompanying oil production from most of the oil districts, and while large amounts were flared in the early days just as in our own country, now gasoline absorption plants have been built to save the natural gas-gasoline, and a considerable gallonage is produced. Gas in the Baku region is principally from oil fields; it contains 73-95 per cent of hydrocarbons, with carbon dioxide and nitrogen making up the remainder. Of fields principally gas, there may be mentioned those of Saratov (where a large number of potential structures are reported still to be developed), Daghestan, Shugarov, and Astrakan.

In 1940, Russian geologists estimated available gas reserves at 1.8 trillion cubic feet of which about one-third was from gas fields and the remainder from oil fields. Inclusive of possible reserves, their estimate was 32.7 trillion cubic feet, about half from gas fields. A more recent estimate of the Daghestan gas reserves

alone is reported as given by Kovalevsky at 3 billion tons. To what extent the proved gas has been increased since 1940 is unknown. United States proved gas reserves as of the end of 1946, estimated by the American Gas Association, are 160 trillion cubic feet. In the writer's estimates of oil reserves herein there is no effort to separate gas reserves.

SUMMARY OF CLASSIFICATION

Relative importance of districts.—In any attempt to judge relative values it is necessary to weigh subdivisions of provinces, basins, and districts, because deposition may differ sufficiently as, for example, west of the Caspian Sea a better set of conditions appears in all basins than in the Trans-Caspian region, chiefly because of greater depth of marine deposition. West Georgia and West Kuban regions appear less favorable than farther east, and for the same reason. Another example is the west coast of Kamchatka classed as primary, where conditions are not yet amply known to rate it with other primary localities. In second class, the south part of the East Russian basin is more important than the Pechora basin. Likewise, Eastern Russia may have a higher value than the Turgai-Ob and Yenisei basins, or than the Ukrainian. The Pre-Caspian basin may rate somewhat higher than that of East Russia or Kazakh, while Chu River is probably less important. The Danubian basin is more important than the Bessarabian-North Black Sea, Crimean-Azov syncline, and particularly more so than the Hungarian. The East Kamchatka region may well be proved of as great importance as the East Russian basin. The East Sakhalin coastal plain is small but will be highly productive. Perhaps the entire north part of the Moscow basin should not be counted. Among fourth-class areas, the Yana and Andyr basins especially offer possibilities.

The principal Soviet development thus far has been in the Southeast Caucasus, in the Trans-Caucasus, in the Emba district, and the East Russian basin, with the Trans-Caspian, Ferghana Valley, Sakhalin (Japanese development), and a lesser amount in the Ukraine and Uzbek. Hence, not only is there the room for intensive and deeper developments, but very great districts remain untouched.

Above 60° Parallel.—Considerable territory in the second, third, and fourth categories falls above the 60th parallel, as follows.

	<i>Square Miles</i>
Secondary	753,000
Tertiary	478,836
Possible	276,183

Of these areas, those of the Pechora basin, the Ob and Khatanga depressions, Yana basin, Anadyr basin, and Kamchatka region are the more important. Enough work has been done by the Russians (and some by Americans in Alaska), to prove that operations are practical even though ice and cold increase the cost and lower the efficiency. The inefficiency can be partially eliminated with greater experience. Certain it is that development of these areas may be deferred and the U.S.S.R. still have very large oil territories to develop.

Deep-sea areas.—In addition to the figures given in the table, the following deep-water areas exist, and are too deep for exploration under present conditions. Primary: (1) North Black Sea, 1,345 square miles, (2) Black Sea extension of Danubian basin, 77,295 square miles, (3) Trans-Caucasus section, Caspian Sea, 19,625 square miles, and (4) Baku section, Caspian Sea, 28,056 square miles. The total is 126,321 square miles primary; and in Black Sea areas there are 3,586 square miles of tertiary grade.

Younger beds.—Since Pratt has indicated that 80 per cent of the world's production has come from younger formations, Cretaceous through Pliocene, it is important to note that the areal extent of such basins, counting only those that have been affected by Mesozoic and later folding, is 1,007,000 square miles.

Categories and basins.—In any estimate of the ultimate oil-reserve possibilities of the U.S.S.R. it is clear that the total areas worthy of development are very large compared with that of any other nation, and since the basic geologic conditions do not greatly differ from those of the United States, we must agree with Wallace Pratt who in a Kansas University lecture in 1941 said of Russia: "Still largely undeveloped, indeed, largely unexplored, they (the oil resources) are nevertheless without question potentially far greater than those of any other nation." This is fully supported by the following summary figures of prospective areas based on the present writer's map and the areal classification table.

The U.S.S.R., out of a total land and lake surficial area of 8,390,000 square miles, has 3,625,425 square miles of prospective oil territory inclusive of 126,971 square miles of under-water lake areas; in addition, there are 406,480 square miles off-shore in seas and oceans of prospective territory, and finally there are 93,000 square miles worthy of further investigation belonging in the fourth group. This gives an over-all land and sea prospective sedimentary area in excess of 4,000,000 square miles. In European affiliated and controlled countries there is an additional, chiefly primary, area of 130,000 square miles.

Divided into the principal categories shown on the map, there are: Primary, 1,248,727 square miles; Secondary, 1,378,578 square miles, Tertiary, 1,164,986 square miles, and selected from the fourth group, 239,417 square miles.

If we summarize contiguous areas of the principal synclinal and monoclinical stratigraphic areas, we find single basins and their genetic extensions very large as is shown by the following figures.

	<i>Square Miles</i>	<i>Categories</i>
Moscow and Timan	255,000	(3rd)
Pechora-East Russian	536,121	(1st & 2nd)
South Russian province	543,039	(1st)
Trans-Caspian basin	478,663	(1st & 3rd)
South Caucasian basin	72,900	(1st; in addition large deep sea areas)
West Siberian province	992,645	(2nd & 3rd)
Khatanga graben	287,700	(3rd)
Northeast Siberia (Yana and Anadyr basins)	216,000	(3rd or 4th)
Kamchatka	188,753	(1st & 2nd)
Sakhalin, East	26,900	(1st)
Sakhalin, West	21,533	(2nd)

For comparison, the Gulf Coast-Mississippi embayment region inclusive of northeast Mexico, land area only, covers 190,000 square miles and the West Texas-New Mexico Permian basin 50,000 square miles. Those Soviet areas most comparable with the Gulf Coast are the Trans-Caspian and South Caspian basins which were intercommunicating in the Caspian Sea, while conditions in the East Russian basin parallel those of the West Texas basin.

Lewis G. Weeks advises the writer that his estimates of ultimate oil in sedimentary basins have two principal bases: (1) reserves of special basinal areas on an areal basis, and (2) oil content per cubic mile to a maximum depth of 20,000 feet, but only to the average estimated thickness if of less depth; where depth is greater than 20,000 feet it is ignored. He makes use of known production and estimated reserves of certain United States areas, his estimates in barrels of oil per cubic mile being as follows.

	<i>Barrels</i>
Michigan and Kentucky basins, each	6,000
Illinois	35,000
Texas Gulf Coast (to the Cretaceous boundary)	60,000
Oklahoma	70,000
California	180,000
Texas as a whole	38,000

He states larger concentrations favor mobile basin types. For producing basins of the United States, he used an average figure of 30,000 barrels. He further states that in well developed basins the percentage of total basin area that will be proved productive may vary from less than $\frac{1}{2}$ -1 per cent to as much as 5 or 6 per cent. Such percentages and per-acre yields, as well as the productivity per cubic mile vary in accordance with certain factors. Among these are the class of basin, degree of mobility, the deposition bottom environment and history, the structural history, type and degree of porosity development, portion or elements of the original basin represented today, and so on. Over large areal units ranging up to continental proportions, the errors in estimating small areas or basins will tend to iron out.

For the sedimentary basins of the world, he gives: area, 15,000,000 square miles; mass 20,000,000 cubic miles; and content, 600 billion barrels of oil.

His estimate of United States sedimentary basins exploitable for oil is 1,400,000 square miles and 2,000,000 cubic miles, to which he given an ultimate estimated production of 100,000,000,000 barrels.

As United States production has been 34,000,000,000 barrels and proved reserves are estimated at 24,000,000,000 barrels, there remain speculative reserves of 42,000,000,000 barrels to be found and intensively developed.

Weeks' Russian equivalent is 1,200,000 square miles in European Russia plus 2,500,000 in Siberia. These are somewhat different basinal areas from those the writer has outlined. His estimate for ultimate reserve is 160,000,000,000 barrels, based on a total volume of 5,000,000 cubic miles at 32,000 barrels per cubic mile. Of this, 2,000,000 cubic miles are allotted to European Russia at 50,000 barrels per

cubic mile and 3,000,000 cubic miles to Siberia at 20,000 barrels per cubic mile. For continental shelves, he would allot additional value for both nations.

Comparing Soviet areas in kind with those given by Weeks for certain United States regions, and allowing for average depth of favorable sedimentaries in each basin judged by available data, the writer obtains for the U.S.S.R. the following figures inclusive of land and continental shelf: for the more important districts, namely, Moscow-East Russian basin, Pre-Caspian and extension, Trans-Caspian, South Caucasus, and East Sakhalin, a total area of 1,805,000 square miles with sedimentaries totaling 2,736,000 cubic miles and having an oil-gas content of 162,000,000,000 barrels. Additionally of much more speculative character, 1,650,000 square miles, with an estimated total of 1,708,000 cubic miles of sedimentary rocks, may yield an ultimate of 33,000,000,000 barrels. Of this only 6,000,000,000 have been produced and about 8,000,000,000 proved, leaving the balance to be found and developed, a truly stupendous task, although a large number of mapped structures await adequate testing.

It appears likely and reasonable, therefore, to conclude that the Soviet Union has within its own borders an ultimate oil reserve of at least 150-160 billion barrels, and it may conceivably approach 180-190 billion barrels. If allowance is made for areas under Soviet control, it is clear that the U.S.S.R. dominates more than one-third of the total ultimate oil reserve of the entire world.

In the August, 1947, *A.A.P.G. Bulletin*, the writer pointed out that the Middle East ultimate reserves should be of the order of 100,000,000,000 barrels; it may reach 130,000,000,000 barrels. Its chief advantage is the great thickness of producing strata so that large production may be obtained from a smaller number of wells and cost per barrel will be very low.

SOVIET AFFILIATED AND CONTROLLED COUNTRIES

Of the Danubian basin and contiguous sub-Carpathians, a fuller statement was given previously, since part of this is now Soviet owned, the U.S.S.R. having taken over the greater part of the Polish Galician oil fields and Bessarabia. What remains in Roumanian hands is still one of the most important producing provinces of Europe; the basinal part is practically untested, and likewise its southern part which is in Bulgaria. This basin including offshore area in the Black Sea covers 75,000 square miles.

The Hungarian basin covering 55,000 square miles has been only partly developed, although it is not as important as the Danubian. In the southeast, the Transylvanian section has principally gas fields. The north part in Hungary and the most westerly area which is in Austria contain some productive oil fields.

South of, and adjacent to, southeast Siberia are Tannu Tuva and Outer Mongolia. In Tannu Tuva is a basinal area covering most of this small state. It is bounded on the north by the West Sajon and the Ost Sajon Mountains. It is made up chiefly of older Paleozoic rocks and probably is of small prospective value.

On the south, in adjoining Outer Mongolia, are smaller graben valleys before

the Mongolia Altai Mountains are reached, but they are narrower and probably of even less value. On the east, and covering much of the country, is the Gobia shield. The stratigraphic studies of Berkey, Morris, and others make it seem doubtful if there are any important prospective oil areas in Outer Mongolia.

Thus, there are under control of the Soviet Union an additional 130,000 square miles of oil exploitable territory in eastern Europe which will ultimately yield large reserves, but is particularly important to the Union now because of her need for immediate production.

MAKING ULTIMATES EFFECTIVE

In the United States large sums of money with devoted application of a very large group of risk-, incentive-, and pioneer-minded corporations and individuals, as well as a period of 80 years, were necessary to develop our oil reserves. United States corporations and individuals have more than 17 billion dollars invested, and a program calling for the expenditure of 10 billions more of capital over the next 5 years for our own and foreign fields. In the United States alone there are 424,000 producing oil wells, a large number of gas wells, and many thousands of dry holes. The last are a necessary part of the cost of finding and developing oil fields. In 1946, there were completed 16,169 oil wells, 3,303 gas wells, and 8,515 dry holes. The average depth of hole in United States in 1946 was 3,342 feet. Deep drilling 12,000 feet and deeper, is only a matter of 10-12 years in the future.

In contrast, development is very young in the U.S.S.R., which as already stated, is 30 years behind the United States. The Soviets have only an estimated 12,000 producing wells, and are thought to have completed in 1946 about 800 oil wells according to the *Oil Weekly*. Until 1944, there were 117 fields discovered, of which 34 were found after 1940. The present reported total is 172, of which 36 are in Asia. Besides, the average depth drilled is much less than in the United States. Outside of Baku and occasionally elsewhere, with maximum producing zones to a depth of 10,200 feet, not even medium-depths wells (5,500-9,600 feet) were drilled before 1944, and most were 2,000-3,500 feet.

The laying of Soviet oil and gas lines was speeded by the last war. Greater use of gas by city and industry is now being made, but still it is only a beginning. A start has been made in reallocating and building new oil pipelines to speed better distribution, but only a start since the total mileage as yet is small. There is great use of tankers on the Caspian and Black seas; also on rivers and new canal net-works.

Due to decreased imports both from affiliated countries and the United States, as well as lowered or inadequate production at home, Robert S. Allen recently reported that a reorganization of the personnel has been ordered of the Russian oil trusts to increase Soviet production. It has been elsewhere reported that Roumania is preparing to divert part of its output from the 95½ per cent being sent to Russia. Part of the diversion may be needed by other countries under Soviet control from whom also United States oil imports have recently been

cut. Although the input of water is a conservation measure, the injection of about 58,000 barrels daily into the Tuimazy oil reservoir is evidence of the heavy pulling from Soviet wells.

While the U.S.S.R. has great potential oil and gas reserves, it is clear that a period of many years, large expenditures, greater allocations of steel and machine tools, and a much increased technical personnel are required to develop them. This requires diversion from other industries and especially from the military, which apparently still absorbs much of the heavy industry. Besides, Soviet industry as a whole has heavy rebuilding tasks due to Czarist backwardness and two great wars, not to speak of the large new developments necessary in consumer and other lines to give its people a modern living standard and permit the country to rank as its size, resources, and number of people warrant as the second greatest nation. It will require much expenditure and a long peacetime effort to industrialize the Soviet Union.

OTHER SOURCES OF POWER

Oil is the most mobile of power sources and it is clear that Soviet Russia's ultimate store is large. On what other power sources can she depend?

Her coal reserves, according to George B. Cressey, amount to 1.654 trillion metric tons, being only second to those of the United States which are estimated at 2.889 trillion tons, with China in third place. According to C. A. Carlow, these estimates require downward revision, and are probably too high. The Soviet coal is well distributed from the Moscow basin on the west to Khabarovsk in the Far East. In 1940, there were mined 164.6 million metric tons. Some producer gas is reported being made by burning coal in place in the Donets basin. Two plants for hydrogenation and one for synthetic petrol are to be built by the Soviets. There can be no question that ample power sources are available for centuries to come for both the Soviet Union and the United States within their own boundaries, now that gas and oil products can be produced from coal on an almost competitive basis with that from oil. The initial drawback is the high capital investment necessary for building the plants.

In the U.S.S.R. there is an abundance of bituminous and kerogen (oil) shales in formations principally of Ordovician, Upper Devonian, Upper Carboniferous, and Upper Jurassic age. It is estimated this amounts to 15 billion metric tons from the following districts: Leningrad, Moscow basin, East Russian basin, Ural Mountains, and Pre-Caspian basin. With recoverable oil at only 10 gallons per ton of shale, it has been estimated that this tonnage would yield 3.5 billion barrels of oil minimum, when fully processed. In addition other sources of oil shale are the Kuznetsk, Minusinsk, and Donets basins, Ferghana Valley, and Lake Baikal region.

Major Cadman reports the world's proved reserve stock of kerogen and bituminous shales at one million million tons. He reports Estonian bituminous shale to contain 48-86 gallons of oil per ton, and the Germans during their occu-

pation set a goal of recovering 12,000,000 barrels of oil annually from this source. Three new shale refineries are now under construction there and gas from them is to be piped to Leningrad; these refineries will supply chemicals, plastics, and sulphur as by-products.

Esthonian bituminous shale is interbedded with Ordovician chalk beds, the shale having an aggregate thickness of two meters, and underlies the Baltic coastal strip in a width of 25 miles. In this study, it is estimated that it represents a tonnage of more than 16 billion metric tons with an oil content of the order of 16 billion barrels. In the Leningrad district the northeast extension of the same beds is estimated in excess of 2.5 billion tons. Another principal source of Soviet bituminous shales is of Jurassic age and occurs in the Lower Volga region and also exceeds 2.5 billion tons. Large-scale stripping operations are necessary for mining these shales. From recent reports, gasoline from shale can be produced at 8-10 cents per gallon and at a slightly higher cost than from coal and oil, based on present oil prices.

Hydro-electric power potential is also very large in the Soviet Union according to Cressey. Based on stream flow available, half the time (some of the projects are affected by their far-north position) potential hydro-electric power amounts to 280,690,000 kilowatts. The projects under development and proposed cover 15,000,000 kilowatts on the Volga, upper Yenisei, and Angara rivers, and in addition there is the plant on the Dneiper River which pre-war had a 900,000 kilowatt capacity. The aggregate capacity at present is not known, but in 1940 it was 2,500,000 kilowatts.

The United States had at end of 1945 an installed hydro-electric capacity of 15,000,000 kilowatts. Our total hydro-electric and otherwise-derived electric-power capacity are in excess of 65,000,000 and will exceed 70,000,000 kilowatts before the end of 1948. It will require heavy expenditures and much time for an equal development in the U.S.S.R.

Of atomic-energy sources in Russia very little is known. It is evident from the map showing shield and pre-Cambrian areas that there are ample regions for uranium vein prospecting. Recently, Major Cadman quotes Joseph Eklund of the Swedish Geological Survey as reporting Swedish oil shale already mined as containing 0.1-1 per cent of uranium and estimated to contain 50,000 tons of uranium; he further estimates Swedish oil shale averaging 0.2 per cent uranium will yield 1,000,000 tons of uranium and states that the United States and Soviet Russia each have a like quantity available from oil shales; each nation has greater quantities if lower uranium content proves recoverable. Extraction cost is estimated at 200 kroner (\$55.70) per kilo, or about \$22 per pound of ordinary uranium. One pound of fissionable uranium is able to develop as much energy as 10,000 tons of pure coal, but only one pound of fissionable uranium is available to each 140 pounds of uranium metal. It is impractical at present to compare the equivalency of coal and uranium and it will be some years yet before practical

uranium power plants are in operation. It seems possible that Soviet purchases are being made from Sweden.

From a good source, it is learned that very little is being exported from Joachimstal in Bohemia to Soviet Russia, and that another locality, Piestamy, is considered favorable for prospecting. In Saxony (east Germany) now under Soviet control, 8,800 workers are mining the lean uranium veins; none is being obtained from Marienbad where 1,200 additional workers are engaged. In a recent Russian paper on rarer metals, no mention was made of atomic-energy sources.

The world's pre-war known large commercial vein deposits of uranium are only those of Great Bear Lake in Canada and of Katanga, Belgian Congo, with a number of other small scattered deposits. If, as Eklund points out, it is practical to recover uranium from certain oil shales, it may be that further research will prove this an important resource in the United States and elsewhere.

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ZONES OF PLATTIN-JOACHIM OF EASTERN MISSOURI¹

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ABSTRACT

Examination of cable-tool cuttings from water wells has resulted in the establishment of four zones in the "Plattin" and two zones in the "Joachim" as previously described. The zoning is based upon lithology and insoluble residues. A cross section through 14 selected wells extending approximately 300 miles, from Kirksville in northeast Missouri to Cape Girardeau in southeast Missouri, indicates the position and thickness of the zones where present.

At Cape Girardeau the "Plattin" is 600 feet thick and the "Joachim" is 250 feet thick. In the type areas approximately 75 miles northwest, the "Plattin" thickness is 200 feet and the "Joachim" is 175 feet. In northeast Missouri in the vicinity of Kirksville both formations are overlapped by the "Decorah," where the latter rests on the St. Peter. The cross section indicates that older beds are overlapped from southeast to northwest and suggests an unconformity at the base of the "Decorah."

Some of the subsurface zones have been located at the outcrop at widely separated localities and can be used in surface mapping. Re-definition of the "Plattin-Joachim" boundary is desirable. The name Rock Levee, derived from a place of that name approximately 3 miles southwest of Cape Girardeau and near the intersection of U. S. Highway 61 and Missouri Highway 74 is proposed for the rocks lying between the re-defined Plattin and Joachim. The term "Decorah" as used in Missouri requires more specific definition.

INTRODUCTION

The Ordovician section of eastern Missouri consists in part of the following formations.³

Previous Work

Kimmswick, limestone and dolomite
"Decorah," shale and limestone
"Plattin," limestone and dolomite
"Joachim," dolomite and limestone
Dutchtown, limestone and shale
St. Peter, sandstone

Re-defined

Kimmswick
"Decorah"
Plattin
Rock Levee
Dutchtown
St. Peter

This paper is concerned primarily with the "Plattin" and "Joachim" formations. At the type localities of these formations, in Jefferson County, the "Plattin" is limestone and the "Joachim" is dolomite. The contrasting lithologic characteristics serve fairly well to delimit the formations in the vicinity of the type localities. However, at the south in Perry, Ste. Genevieve, and Cape Girardeau counties, surface mapping has shown that it becomes more difficult to draw the contact, because the limestones, which are present in the upper 50-100 feet of the "Joachim," are very similar in lithologic character to those in the "Plattin." Both Weller⁴ and Flint⁵ had difficulty in determining the contact with certainty.

¹ Read before the Eastern Interior regional meeting at St. Louis, January 15, 1948. Manuscript received, January 21, 1948. Published by permission of the State geologist, Missouri Geological Survey and Water Resources.

² Assistant State geologist.

³ "Plattin," "Joachim," and "Decorah" are as defined by previous authors. Plattin and Joachim without the " " are used as redefined in this paper.

⁴ Stuart Weller and Stuart St. Clair, "Geology of Ste. Genevieve County, Missouri," *Missouri Bur. Geol. and Mines*, 2d Ser., Vol. 22 (1928), pp. 107-08.

⁵ Richard F. Flint, "Geology of Parts of Perry and Cape Girardeau Counties," *Missouri Geol. Survey*, unpublished report (1925), pp. 24-26, 28, 32-33.

North of the Missouri River the "Plattin" is dolomitized and has often been mistaken for "Joachim." Fossils found in the so-called "Joachim" dolomite⁶ just north of Big Springs on Missouri Highway 19 in Montgomery County, were identified as Plattin forms. The identification was confirmed by E. B. Branson of the department of geology at the University of Missouri.

Similar difficulties were noted in logging samples of cuttings from wells. Frequently drillers or owners submit samples from drilling wells and request estimates of depths to certain underlying aquifers. Where such wells start in the "Plattin" or "Joachim," the estimate of depth to the St. Peter is difficult. This is especially true in southeastern Missouri where the "Plattin" and "Joachim" expand greatly in thickness. Interbedded limestones and dolomites appear in basal "Plattin" and upper "Joachim," making that lithologic criteria unsatisfactory for purpose of drawing a reliable contact. During the past 10 years the writer, using insoluble residues and lithology, has made a study of samples of several hundred wells which contained the section from the "Decorah" to the St. Peter. The results indicate that the "Plattin" and "Joachim" can be zoned. Insoluble residues were found to be diagnostic and persistent through the limestone-dolomite facies.

A very persistent zone of oölitic and conglomeratic limestone was noted to occur in the lower "Plattin." At places this oölite rests on dolomite and at others on limestone. It is so reliable in its occurrence that it appears to be a more satisfactory criterion for the base of the Plattin than any heretofore proposed and is so used in this paper. This zone is associated with green shale and limestone which contain an abundance of *Ostracoda*. Other zones, which are rather persistent, are present in the Plattin.

A chert zone which is persistent for several hundred miles was noted in the "Joachim." Insofar as available information is concerned, this is the only noted occurrence of chert in the "Joachim." The writer proposes that this chert is the top of the Joachim formation.

For the interval between the oölitic and conglomeratic limestone and the top of the chert, aforementioned, the name Rock Levee is here proposed.

Location.—The study is primarily one of subsurface and embraces most of that part of eastern Missouri more or less contiguous to the Mississippi River as shown by Figure 1.

STRATIGRAPHY

DECORAH FORMATION

This formation was named by Calvin⁷ from exposures in the city limits of Decorah where it consists of beds of very calcareous green shale with numerous

⁶ "Guide Book, Fifteenth Annual Field Conference," *Kansas Geol. Soc.* (1941), p. 45, Fig. 24, stop 22.

⁷ S. Calvin, "Geology of Winneshiek County, Iowa," *Iowa Geol. Survey*, Vol. 16 (1905), p. 84.



FIG. 1.—Line of cross section through wells in eastern Missouri.

bands and nodules of limestone, ranging from 25 to 30 feet in thickness. Weller⁸ used the term in Missouri. The "Decorah" was later divided into the Ion, Guttenberg, and Spechts Ferry, in descending order, by Kay.⁹ He¹⁰ also stated that the Missouri "Decorah" was equivalent to the Spechts Ferry. Nevertheless, "Decorah" has been in usage by the Missouri Geological Survey in subsequent

⁸ Stuart Weller, *op. cit.*, p. 110.

⁹ G. Marshall Kay, "Divisions of the Decorah Formation," *Science*, Vol. 67 (1928), p. 16.

¹⁰ ———, in the "Guide Book, Ninth Annual Field Conference," *Kansas Geol. Soc.* (1935), p. 288.

publications.^{11,12,13} Branson¹⁴ considers the term unwarranted in Missouri, saying that the shales are upper Plattin. This would correspond with Kay's idea that the Missouri "Decorah" is Spechts Ferry. This would not be a serious difference if it were only one of nomenclature. However, it involves certain geologic concepts which seem to be in contradiction. Ulrich¹⁵ in his correlation charts indicates a hiatus between the Decorah and Plattin in southeastern Missouri. The fact that in Missouri hundreds of wells widely separated indicate that the occurrence of "Decorah" is coincident with overlying Kimmswick and overlaps various parts of the "Plattin," suggests to the writer that "Decorah" is related more to Kimmswick than "Plattin" and that a hiatus exists between the "Decorah" and the "Plattin."

In Missouri "Decorah" consists of shales, limestones, and siliceous limestones. The shales vary from green to brown; metabentonite ordinarily occurs in the lower part. The limestones are thin-bedded, dense, and some beds fossiliferous, though in others fossils are absent. At places they contain silica or a very minutely porous to spongy chert which can be carved with a knife. This chert is commonly cinnamon in color and may contain black specks. The chert ordinarily occurs above the green shales and is common north of the Missouri River. "Decorah" can be easily recognized in well cuttings and is extremely useful as a marker. In northeast Missouri "Decorah" may be dolomite or limestone. The accompanying cross section (Fig. 2) has been constructed on the "Decorah" as a datum plane. Zoning of the underlying formations brings out the fact that "Decorah" is an overlapping formation and not upper "Plattin." If the Spechts Ferry is upper "Plattin," it is difficult to reconcile Missouri "Decorah" with such correlations.

PLATTIN FORMATION

The name "Plattin" was proposed by Ulrich,¹⁶ "for the fine grained limestone formation between the Kimmswick and the 'First Magnesian' (Joachim). The formation takes its name from Plattin Creek, Jefferson County, near the mouth of which it is well exposed." No specific type locality or measured section was given by Ulrich. Weller, Flint, McQueen, and Grohskopf¹⁷ and others continued

¹¹ H. S. McQueen, "Geology of Northwestern Missouri," *Missouri Geol. Survey and Water Resources*, Vol. 25 (1938), p. 41.

¹² J. G. Grohskopf et al., "Subsurface Geology of Northeastern Missouri," *ibid.*, 60th Bien. Rept. (1939), Appendix I, p. 11.

¹³ *Geological Map of Missouri* (1939).

¹⁴ E. B. Branson, "Geology of Missouri," *Univ. Missouri Studies*, Vol. 19 (1944), p. 82.

¹⁵ E. O. Ulrich, "Revision of the Paleozoic Systems," *Bull. Geol. Soc. America*, Vol. 22 (September, 1911), Pl. 27.

¹⁶ E. O. Ulrich, in "The Quarrying Industry in Missouri," *Missouri Bur. Geol. and Mines*, Vol. II, 2d Ser. (1904), p. 111.

¹⁷ *Op. cit.*

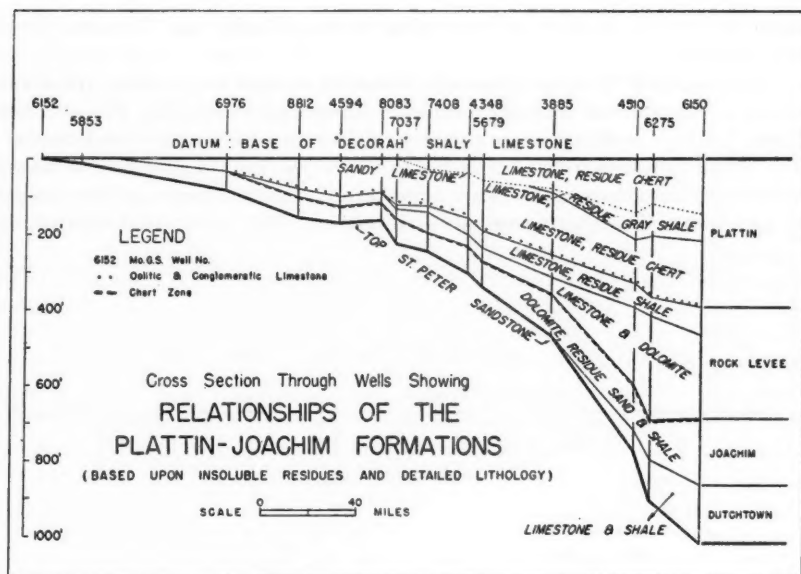


FIG. 2.—Relationships of Platin-Joachim formations based on insoluble residues and detailed lithologic character.

TABLE I
DATA FROM WELLS USED TO CONSTRUCT FIGURE 2¹

Missouri Survey Well Number	S.	T.	R.	Eleva- tion	Total Depth	Depth Base "De- corah"	Depth Oolite	Thick- ness Platin	Depth Chert	Thick- ness Rock Levee	Depth Base Joachim	Thick- ness Joachim	Formation in Which Completed
6,150	5	30N	14E	353	1,200	85	505	420	775	270	950	175	Everton
6,275*	32	10S	3W	362	2,204	1,380	1,750	370	2,070	320	2,180	110	St. Peter
4,510	28	34N	13E	580	870	75	405	330	675	270	795	120	St. Peter
3,885	30	38N	9E	450	1,200	660	915	255	1,020	105	1,130	110	St. Peter
5,079	5	41N	6E	416	425	55	250	195	320	70	400	80	St. Peter
4,348	16	42N	5E	693	395	50	210?	100	285	75	350	65	St. Peter
7,408	10	44N	3E	620	350	40	165?	125	235	70	285	50	St. Peter
7,037	12	46N	2E	605	685	435	560	135	620	60	660	40	St. Peter
8,083	10	47N	2E	608	810	480	570?	90	595	25	645	50	Cotter
4,594	31	50N	1E	639	732	450	550	100	575	25	620	45	Cotter
8,812	4	52N	1W	740	433	160	240	80	260	20	315	55	St. Peter
6,976	3	53N	6W	743	435	330?	365?	35	Absent	Absent	415	50	St. Peter
5,853	18	61N	12W	850	935	805	Absent	Absent	Absent	Absent	815	12	Jefferson City
6,152	8	63N	14W	962	1,247	1,135	Absent	Absent	Absent	Absent	Absent	Absent	Cotter

¹ Elevation, depth, and thickness shown in feet.

* Well No. 6275 is in Jackson County, Illinois.

using the term in its more or less original sense, excluding the "Decorah" from the "Plattin."

The so-called "Plattin" lithologic character is dove gray, dense limestone, which at the outcrop commonly exhibits differential weathering. Pits or holes about $\frac{1}{4}$ - $\frac{1}{2}$ inch in diameter are common, giving the rock a honey-comb appearance. Bedding ranges from a few inches to several feet in thickness. Some beds are abundantly fossiliferous; others are quite barren. The limestones are very similar in appearance throughout most of the formation. This has created difficulty in

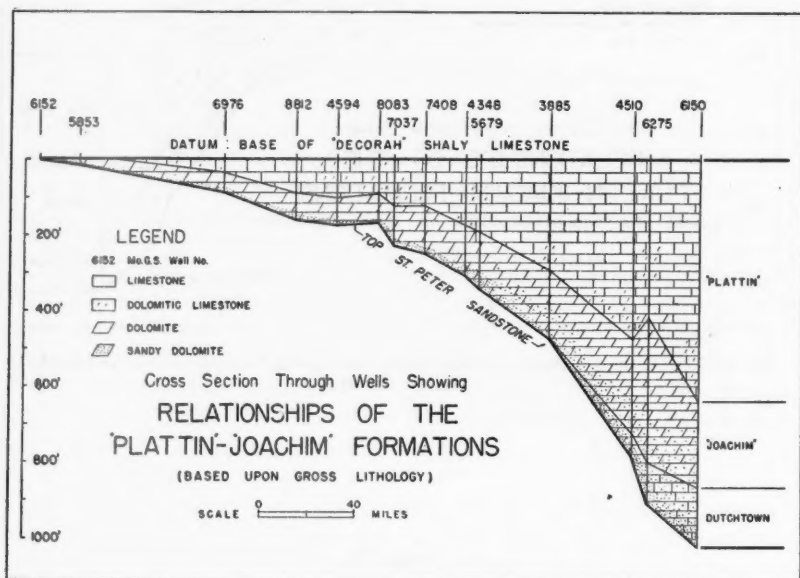


FIG. 3.—Relationship of "Plattin"-Joachim" formations based on gross lithology.

designating exactly what part of the section contains certain fossil assemblages. Furthermore, in areas where the "Plattin" is most thick, dolomites similar in appearance to those in the "Joachim" are interbedded with the lower "Plattin" limestones. Surface workers have not been too certain of the position of various beds in the "Plattin" with respect of one to the other; because of this it has been assumed that the upper beds are those which lie beneath the "Decorah." Such a concept indicates progressive overlap,¹⁸ and indicates that the upper part of the "Plattin" is the most continuous and widespread (Fig. 3.). However, zoning of the "Plattin" (Fig. 2) indicates the opposite for eastern Missouri.

¹⁸ E. P. Dubois, "Sub-surface Relations of the Maquoketa and 'Trenton' Formations in Illinois," *Illinois Geol. Survey Rept. Inv. 105* (1945), p. 33.

Upper Chert zone.—The zone is composed of dense dove gray to almost lithographic limestone. In some wells a few rhombs of dolomite crystals are embedded in the limestone matrix but no true dolomite beds are evident. Insoluble residues are ordinarily less than 10 per cent by volume. Residues consist in the main of dark gray, tan, smooth, sub-translucent chert, some which may be dolomoldic. Lesser amounts of porous silt or shale may also be present. The shale is commonly gray to tan in color and may contain imprints of fossils. Silicified fragments of brachiopods, bryozoans, and segments of echinoderm stems are common. None of these are restricted to this zone. However, the base is marked by limestone which contains 5 per cent or less of very fine sand grains. Size of the grains range from 0.014 millimeter to 0.09 millimeter. The grains are not easily visible in the limestone but show very plainly in the insoluble residue. The basal sandy limestone appears to be no more than 5 feet thick in well cuttings. Though it has not been located at the outcrop, its distribution in wells suggests that it has been overlooked. It is present in wells from southern St. Louis County to Cape Girardeau (Fig. 2). The thickness of this Upper Chert zone ranges from 145 feet at Cape Girardeau to zero in southern St. Louis County where it is overlapped by "Decorah."

Upper Shale zone.—The lithologic character is similar to that already described excepting that shale is the dominant residue, being less than 10 per cent by volume. Its occurrence seems to be restricted to Ste. Genevieve, Perry, and Cape Girardeau. Thickness ranges from 75 feet at Cape Girardeau to zero in northern Ste. Genevieve County where it pinches out.

Lower Chert zone.—This zone is practically identical lithologically with the Upper Chert zone, and can only be differentiated from it by the character of the top and bottom beds. Where the Upper Chert zone is in contact with the Lower Chert zone, the sandy limestone serves as a contact.

Oölite and Conglomerate zone.—Beneath the Lower Chert zone there occurs an oölitic and conglomeratic limestone, associated with dense gray limestone which contains an abundance of *Ostracoda*. Interbedded green shales and limestones are also prominent in these beds. The shales range from 6 inches to 2 feet in thickness.

The oörites range in diameter from 0.1 mm. to 1.0 mm. In well cuttings it is necessary to wet some samples in order to note their presence. On the weathered outcrop many of the oörites appear almost white, in contrast to the dark gray dense limestone matrix. Where such is not the case, it may be necessary to use a hand lens to see it. The conglomerate consists of irregularly shaped fragments of dense limestone in a dense limestone matrix. The fragments range from $\frac{1}{8}$ inch to $\frac{1}{2}$ inch in greatest dimension and are characteristically tabular. The fragments may be parallel with or lie at an angle to the bedding planes (Fig. 4). The conglomerate can not be recognized in well cuttings, but on the weathered outcrop it is readily discernible. The pebbles and shingles are almost white in sharp contrast to the darker limestone matrix.

In the type area of the "Plattin" the Oölitic and Conglomeratic zone may be underlain by 10-15 feet of dense limestones which in turn rest on "Joachim" dolomite. This essentially corresponds with the original definition of the base of the "Plattin."¹⁹ The oölite has been found in hundreds of wells in widely separated

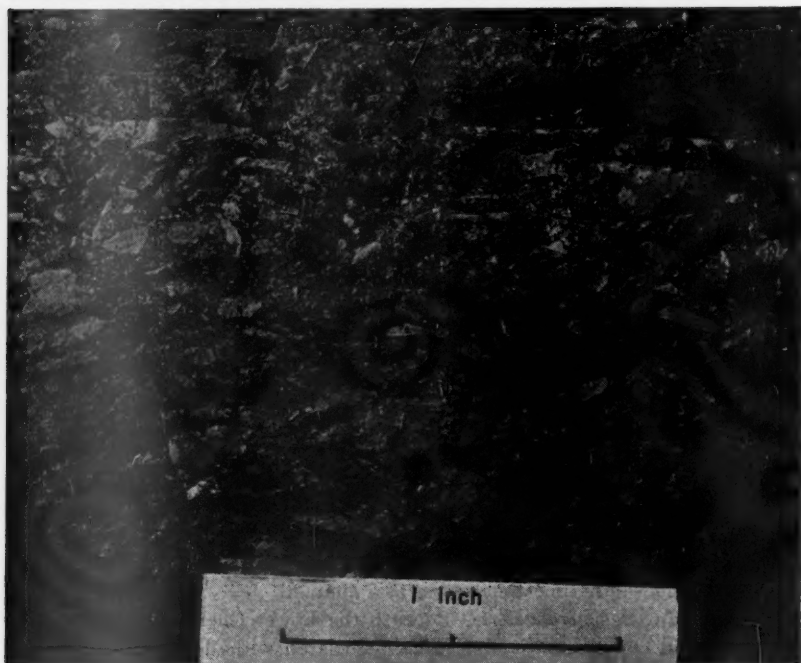


FIG. 4.—Oölitic and conglomeratic limestone of basal Plattin formation.

localities in eastern Missouri. It always occurs in the same association and position. Because it is widespread, rather easily recognized, and overlaps underlying rocks (Fig. 2), it has been designated as the base of the Plattin in subsurface work.

In his latest correlation table Ulrich²⁰ placed the Plattin in the Black River group. He²¹ also stated that the Plattin includes the Lowville and Lebanon formations. Differences in fauna in the limestones above the oölite and conglomerate

¹⁹ E. O. Ulrich, *op. cit.*, p. 111.

²⁰ E. O. Ulrich, in the "Guide Book, Thirteenth Annual Field Conference," *Kansas Geol. Soc.* (1939), p. 106.

²¹ E. O. Ulrich, *op. cit.*, p. 108.

and those below suggested to Ulrich²² that the oölite and conglomerate were basal Plattin.

The oölite and conglomerate have been noted on the outcrop at many localities in St. Louis by N. S. Hinchey,²³ of the geology department of Washington University, who used them as the base of the Plattin in surface mapping. Potter²⁴ also noted their occurrence in Lincoln County.

Localities of oölite and conglomerate.—Loc. 1. NE. $\frac{1}{4}$, NW. $\frac{1}{4}$, Sec. 24, T. 30 N., R. 13 E., Cape Girardeau County. In exposures on the north side of Missouri Highway 74 and 0.2 mile by odometer east of U. S. Highway 61.

Loc. 2. NW. $\frac{1}{4}$, NW. $\frac{1}{4}$, SE. $\frac{1}{4}$, Sec. 35 (projected),²⁵ T. 32 N., R. 12 E., about 2.0 miles north of Jackson, Cape Girardeau County. The crop is west of the McFerron School road, in a draw and just northwest of an abandoned concrete foundation, southeast of the barn.

Loc. 3. SW. $\frac{1}{4}$, NW. $\frac{1}{4}$, NW. $\frac{1}{4}$, Sec. 1, T. 41 N., R. 4 E., Jefferson County. The crop is in road cut on the northwest side of Missouri Highway 21 and 2.0 miles by odometer north of the center of Sandy Creek.

Loc. 4. SE. $\frac{1}{4}$, SW. $\frac{1}{4}$, NE. $\frac{1}{4}$, Sec. 18, T. 42 N., R. 4 E., Jefferson County. The crop is in a road cut on the north side of Missouri Highway 30 and 0.75 mile by odometer northeast of Sand Creek, about the middle of the cut.

Loc. 5. SE. $\frac{1}{4}$, NW. $\frac{1}{4}$, Sec. 4, T. 43 N., R. 3 E., St. Louis County. The crop is in a road cut on the northwest side of U. S. Highway 66, and 3.15 miles by odometer east of the Franklin County boundary line. The oölite and conglomerate occur at the southwest end of the cut in the lower part of the exposure.

Loc. 6. SW. $\frac{1}{4}$, NW. $\frac{1}{4}$, SW. $\frac{1}{4}$, Sec. 33, T. 44 N., R. 4 E., St. Louis County. The crop is in a road cut on the north side of U. S. Highway 66 and 0.25 mile by odometer east of the east end of bridge over the Meramec River. Oölite is exposed at the west end of the cut and the conglomerate is at the east end.

Loc. 7. SW. $\frac{1}{4}$, SW. $\frac{1}{4}$, SW. $\frac{1}{4}$, Sec. 26, T. 48 N., R. 6 W., Montgomery County. The crop is in a road cut on the southeast side of U. S. Highway 40, and 1.0 mile by odometer east of the bridge over Loutre River.

Loc. 8. SE. cor., NE. $\frac{1}{4}$, Sec. 4, T. 50 N., R. 1 W., Lincoln County. North of a tributary to Mill Creek, about $2\frac{1}{2}$ miles east of the town of Silex.

The foregoing localities are only a few of the many which are known. They are listed chiefly because of their accessibility and to show geographic distribution. Weller²⁶ mentions widespread occurrence in Illinois.

²² E. O. Ulrich, *op. cit.*, p. 64.

²³ Personal communication, December, 1947.

²⁴ W. B. Potter, "Geology of Lincoln County, Missouri," *Missouri Geol. Survey Prelim. Rept. Iron Ores and Coal Fields* (1873), pp. 229, 231.

²⁵ In a land grant, the section given is a projection of the normal land survey lines which adjoin the grant on the north.

²⁶ J. Marvin Weller, "Geology and Oil Possibilities of Extreme Southern Illinois," *Illinois Geol. Surv. Rept. Inv. 71* (1940), p. 18.

ROCK LEVEE FORMATION

Rock Levee is the name proposed for those rocks which underlie the basal Plattin oölitic and conglomeratic limestone and overlie a chert zone which occurs in the "Joachim" dolomite. Thus it restricts the "Plattin" and "Joachim" and contains a part of each. The name is derived from a siding on the St. Louis-San Francisco Railway located in the NW. $\frac{1}{4}$, NW. $\frac{1}{4}$, NW. $\frac{1}{4}$, Sec. 24, T. 30 N., R. 13 E., Cape Girardeau County. The exact location of the siding is shown in the southeast part of the topographic map of the Cape Girardeau Quadrangle published by the United States Geological Survey in cooperation with the Missouri Division of Geological Survey and Water Resources.

The surface distribution of the Rock Levee is closely allied with the basal Plattin; it is present at the localities which were listed for occurrence of the basal Plattin oölites. The subsurface distribution is indicated by Figures 1 and 2.

In the type area the thickness, as determined from wells, is 270 feet (Table I). The following section was measured and described by McQueen²⁷ at the type locality 0.2 mile east of the junction of U. S. Highway 61 and Missouri Highway 74.

	Feet	Inches
Covered interval.....	10+	0
Black River group		
Plattin formation		
Limestone, dark gray, pebbly, conglomeratic, pebbles up to 2 inches long forming limestone shingle heterogeneously arranged and some places pseudo-oölitic.....	5	0
Limestone, dark brown, thin-bedded with shale partings.....	0	4
Limestone, dark grayish brown, dense, slightly conglomeratic.....	0	11
Limestone, brown.....	0	3
Unconformity		
Stones River group		
Limestone, darker brown with local bluish mottling, very dense, hard and brittle, in massive beds.....	6	6

It will be noted that Stones River group is applied to the limestones for which the present writer proposes the name Rock Levee.

From the type exposure, the beds rise to the junction of U. S. Highway 61 and Missouri Highway 74. The Adams well, Mo. G. S. 3,379, was drilled at the north-east corner of this intersection. The following section was determined from an examination of the samples.

	Feet	
	From	To
Rock Levee formation		
Limestone, dark gray, dense. Insoluble residue less than 10 per cent, brown porous silt, silicified brachiopod fragments.....	0	10
Limestone, as above. Residue less than 10 per cent, gray and brown porous silt....	10	70
As above, some very fine sand grains in residue.....	70	95
Limestone and dolomite interbedded. Residue less than 10 per cent, gray silt and very fine sand.....	95	155

²⁷ H. S. McQueen, in the "Guide Book, Thirteenth Annual Field Conference," *Kansas Geol. Soc.* (1939), p. 64, stop 27.

	Feet	
	From	To
Joachim formation		
Dolomite, with a few pieces of smooth dense gray-white, chert (chert zone)	155	160
Dolomite and interbedded limestone. Residue less than 10 per cent, brown and gray silt, fine sand	160	205
Dolomite, residue less than 10 per cent, very fine sand, brown silt	205	260
Dolomite, residue 10-20 per cent, medium sand	260	270
Dolomite, residue 10-20 per cent, very fine sand and brown silt	270	325
Dutchtown formation		
Limestone and dolomite, residue 25 per cent, shale green and brown, very fine sand	325	330
	Total depth	

It is to be noted that 155 feet of the Rock Levee formation is present in this well. Approximately 50 feet of Rock Levee is exposed in the bluff at this locality. Fossils from this exposure were identified by Ulrich as *Tetradium syringoporoides* and *Protorhyncha ridleyana*. Ulrich²⁸ correlated these rocks with the Murfreesboro of Tennessee, which is the lowermost formation of the Stones River group. Bridge²⁹ concurred in the fossil identification, but would correlate these rocks with the Ridley and also stated that the Stones River is really Black River. The status of the name Stones River is in doubt. Cooper³⁰ would no longer use the name as a general time-rock term. In view of these disagreements the writer believes that the name Rock Levee should be used in Missouri for these rocks until more precise correlations can be made with sections which are agreed on in Tennessee and Virginia.

The Rock Levee as used by the writer, however, includes some beds which have previously been assigned to the "Joachim." These beds are limestone in southeast Missouri, but grade into dolomite in the "Joachim" type area. Figure 2 shows that this unit finally pinches out in northwest Missouri. The chert which is used for the top of the Joachim is a definite contact in the subsurface, more so than lithologic change from limestone to dolomite.

The Rock Levee has in its upper part dense gray limestones, or buff dolomites, the residue of which though small, commonly consists chiefly of shale, with some silicified echinoderm-stem segments which are hereafter referred to as cystids. This zone has a thickness of 70 feet at Cape Girardeau and pinches out toward the north in St. Charles County. Some dense gray to tan dolomoldic chert is associated with the cystids in Cape Girardeau County, Missouri, and in Jackson County, Illinois.

The silicified cystid zone has been noted in the SE. cor., NE. $\frac{1}{4}$, SW. $\frac{1}{4}$, Sec. 31, T. 44 N., R. 4 E., St. Louis County, about $\frac{1}{2}$ miles east of the town of Eureka, St. Louis County, in an outcrop on the north side of U. S. Highway 66, midway between the Missouri Pacific Lines and the St. Louis-San Francisco Railway. At this locality the rock is buff finely crystalline dolomite which has numerous

²⁸ E. O. Ulrich, *op. cit.*, p. 109.

²⁹ Josiah Bridge, oral communication to H. S. McQueen, September 5, 1941.

³⁰ Byron N. Cooper, "The Stones River Equivalents in Appalachian Regions," *Jour. Geol.*, Vol. 53, No. 4 (July, 1945), p. 275.

pits which range from 0.1 to 5.0 mm. in diameter. Insoluble residues from this exposure yielded a few grains of sand and silicified cystid? segments which have a diameter of 0.5 mm. The size range obtained in wells is 0.6-0.9 mm with an average of 0.7 mm. The silica replacing the calcareous cystid is commonly caramel brown in color. Frequently in preparation of residues, the circular outline is destroyed but the zone can be identified by the character of the silica. The pits observed on the outcrop may be molds of cystids and *Ostracoda*. Casts of *Ostracoda* were noted at the locality described.

Lying beneath this cystid zone at Cape Girardeau is a thickness of 200 feet of limestone and dolomite which thins to zero in Ralls County. The residue from this lower Rock Levee zone consists of silt and fine sand, ordinarily less than 10 per cent by volume.

Exposures of the lower part of the Rock Levee are few in the type area because of topography and loess cover. One exposure is at the Arnold Quarry in the SW. $\frac{1}{4}$, NW. $\frac{1}{4}$, NE. $\frac{1}{4}$, Sec. 22 (projected), T. 30 N., R. 13 E., on the north side of Missouri Highway 74 and 1.5 miles west by odometer of the junction with U. S. Highway 61. The exposure consists of 50 feet of buff dolomite interbedded with thin green shale overlain by 5 feet of dense gray limestone in the top of the quarry face. Information from wells drilled nearby indicate that the chert which marks the top of the redefined Joachim would occur just below the bottom of the quarry. An excellent exposure of the contact of the Rock Levee and Joachim is in the SE. $\frac{1}{4}$, NE. $\frac{1}{4}$, SE. $\frac{1}{4}$, Sec. 2, T. 41 N., R. 5 E., Jefferson County, on the west side of Missouri Highway 21 and 1.5 miles by odometer north of Sandy Creek. At this locality Rock Levee dolomite overlies the Joachim chert. Approximately 0.25 mile north and approximately 50 feet stratigraphically higher, a limestone crops out on the east side of Missouri Highway 21; this limestone is the cystid zone. The ostracods and silicified cystids are present in this zone in near-by wells. The basal Platin conglomerate is exposed 0.25 mile farther north.

JOACHIM FORMATION

Winslow³¹ in 1894 applied the name "Joachim" to the rocks which had been designated as the "First Magnesian" in earlier reports of the Missouri Geological Survey. In all subsequent references to Winslow's type locality, that the author has seen, the type locality is designated as Joachim Creek. Actually, the type section named and described by Winslow,³² is on Platin Creek. However, the "Joachim" formation does crop out along Joachim Creek about one mile south of Herculaneum and approximately 3 miles north of his described section. The thickness of Winslow's "Joachim," in the type area, is revealed by wells as 175 feet. This includes the dolomite and magnesian limestone between the St. Peter and Platin.

³¹ Arthur Winslow, "Lead and Zinc Deposits of Missouri," *Missouri Geol. Survey*, 1st Ser., Vol. 6 (1894), p. 352.

³² Arthur Winslow, *op. cit.*, p. 352.

The contact is more difficult to define toward the southeast in Ste. Genevieve, Perry, and Cape Girardeau counties.

All previous workers have stated that no chert occurs in the "Joachim" of Missouri. However, in residues from well cuttings, a few tiny fragments of light gray to almost white chert was noted in many wells which penetrated the Joachim. This chert finally became a marker in subsurface work and has been traced for several hundred miles in eastern Missouri. It has been noted at the surface at two localities. The writer believes careful surface mapping will reveal its presence at many additional localities, where good exposures are available.

It is here proposed that the name Joachim be restricted to the rocks overlying either the Dutchtown or St. Peter and including the chert zone as the top (Fig. 2). This will establish a definite and recognizable formation in the subsurface and should be applicable to the surface.

As thus defined, the Joachim is 175 feet thick at Cape Girardeau and gradually thins northwest until it is overlapped by "Decorah" in the vicinity of Kirksville (Fig. 3).

The Joachim dolomite in its lower part contains sand grains ranging in amount from 5 to 50 per cent. The upper part is relatively non-sandy and commonly has a residue of brown banded shale and gray shale. The lower sandy part seems to be more widely distributed, but this may be more apparent than real because in most of the area St. Peter sandstone is the underlying formation.

An excellent exposure which shows the chert in place and the dolomites above and below it may be seen on Missouri Highway 21 in Jefferson County, on the west side of the highway and 1.5 miles by odometer north of Sandy Creek, in the SE. $\frac{1}{4}$, NE. $\frac{1}{4}$, SE. $\frac{1}{4}$, Sec. 2 (projected), T. 41 N., R. 4 E. At this locality the chert is exposed for a distance of approximately 150 feet in a road cut (Fig. 5). It occurs as a bed which has a maximum thickness of 4 inches and an average thickness of 3 inches; at places it is nearly nodular. A few isolated pieces of chert occur 2-3 feet above the main bed at one place in the outcrop. The chert is overlain by buff, very fine-grained argillaceous dolomite which exhibits undulatory bedding, which may be due to solution slumpage. The chert is light gray to almost white and very dense. Some pieces show alternating bands of light and darker gray. The dolomite beneath the chert is not unlike that lying above but seems to be more porous since it contains masses and veinlets of calcite.

Another exposure of the chert was called to the writer's attention by N. S. Hinchey, of the geological department of Washington University. This locality is about 3 miles north of Eureka on the east side of St. Louis County Highway B, in the NW. $\frac{1}{4}$, SW. $\frac{1}{4}$, NE. $\frac{1}{4}$, Sec. 24, T. 44 N., R. 3 E. The chert is in the ditch just south of the junction of Alt Road and Highway B. The relationships here are not as well shown as at the locality mentioned previously; however, there is no question about the similarity of the cherts in color, texture, thickness, and stratigraphic position. The basal Plattin conglomerate and oölite are found in the ditch, lying approximately 70 feet above the chert.



FIG. 5.—Chert zone at top of Joachim formation.

The distribution of the chert in subsurface is indicated by Figures 1 and 2. It has been recognized by the writer from wells in southwestern Illinois and western Kentucky. It must be emphasized that outcrops indicate the chert is only a few inches thick. In insoluble residues of well cuttings the chert is less than one per cent of a total residue of 5 per cent or less. In good samples from cable-tool wells the chert is readily noted. The writer would anticipate difficulty in rotary samples. Similar remarks apply to the basal 5-foot zone of sandy limestone at the base of the Upper Chert zone of the Plattin.

SUMMARY

Zoning of the Plattin by microscopic studies of well cuttings and their insoluble residues establishes the fact that the "Decorah" is overlapping zones of the Plattin. An oölitic and conglomeratic limestone serves as a recognizable base for the Plattin. The formation termed Rock Levee is completely overlapped by the Plattin. A chert below the cystid zone of the Rock Levee serves as a recognizable top for the Joachim. Sufficient information is not at hand to correlate the zones of the Plattin with Black River formations in Tennessee, Virginia, and New York.

The type of work done by Cooper³³ in Virginia could well be extended to Missouri and other states. Until much more additional interregional surface work is done the subsurface geologist must of necessity, rather than desire, establish units which are recognizable to him. They may be based on detailed observation of what may appear to be minute criteria but which, nevertheless, can be used in subsurface mapping. The writer concurs with Edson³⁴ when she says,

When the surface beds have been mapped and studied in as great a detail, by the same methods as applied to the subsurface beds and by subsurface stratigraphers entirely familiar with the buried occurrences of the Ordovician beds, then an intelligent attempt can be made to correlate the buried sediments with those exposed at the outcrops, . . .

³³ Byron N. Cooper, *op. cit.*

³⁴ Fanny Carter Edson, "Resume of St. Peter Stratigraphy," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 19, No. 8 (August, 1935), p. 1129.

STRATIGRAPHIC COMMISSION

NOTE 3—RULES OF GEOLOGICAL NOMENCLATURE OF THE GEOLOGICAL SURVEY OF CANADA¹

AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

The Commission judges that geologists generally will be interested to read and to have available for reference the Rules of Geological Nomenclature which were formulated by a committee of the Geological Survey of Canada in 1942 and adopted for official use in preparation of map legends and reports. In granting permission to publish the Rules, the Chief Geologist of the Survey, GEORGE HANSON, has suggested that it is appropriate to call attention to the somewhat preliminary nature of the statements as drawn up, and he intimates that additions, as well as possible modifications, may be expected in future.

The rules and definitions are phrased as follows.

System to mean the total assemblage of sedimentary and volcanic rocks formed during a period. Example: Triassic system.

Series to mean the total assemblage of sedimentary and volcanic rocks formed during an epoch. Example: Upper Devonian series. An exception is made in Precambrian rocks, where any conformable succession of sedimentary and/or volcanic formations, bounded by significant faults or unconformities, may be referred to as a series, though its status as representing an epoch cannot be demonstrated. Example: Bruce series.

Group to mean any assemblage of sedimentary or/and volcanic rocks not considered to be a formation, a series, or a system. A group may consist of two or more groups. The term is also applied on occasion to the total assemblage of rocks formed during an era. Example: Mesozoic group.

A sedimentary formation is a lithologically distinctive product of essentially continuous sedimentation selected from 2 local succession of strata as a convenient unit for purposes of mapping, description, and reference.

- (1) *It must contain no apparent evidence of an appreciable break in deposition.* One or more beds or groups of beds of volcanic origin within a sedimentary sequence is not evidence of an interruption of continuous sedimentation if other supporting evidence is lacking. Interruptions due to contemporaneous erosion are not evidence of appreciable breaks in deposition. Paleontology may, in some instances, afford the sole evidence of an appreciable break in the process of continuous sedimentation.
- (2) *In its simplest form it consists dominantly of one general kind of rock,* as, e.g. conglomerate, sandstone, limestone, etc., or, in some instances, of a variety of one of these rock types distinguished by some special feature or features. *But it may include different kinds of rock* when these individually are too thin, lenticular, or variable in composition to be themselves ordinarily selected as formations. Commonly, when a sedimentary formation contains beds of different kinds of rocks, some or all of these alternate in a regular or irregular fashion. Obviously no clear-cut distinction may be drawn between such a formation and a sedimentary group

¹ The Commission is publishing (a) informal statements, discussions, and outlines of problems, which are designated as *Notes* bearing serial numbers. It intends to publish (b) formal pronouncements consisting of declarations, opinions, and recommendations, which will be designated as *Reports*, also serially numbered. Notes 1 and 2 were published in Volume 31 of the *Bulletin*, pp. 513-518, 1947. Reprints of Commission publications are supplied gratis by the American Association of Petroleum Geologists, and through cooperation of the Geological Society of America may be obtained on requests addressed to the Secretary of the Society, 419 W. 117 th St., New York, N. Y.

in which the component formations are, or become, too small, too irregular, or too discontinuous for separate representation. In practice, however, when an assemblage of unsubdivided strata is designated a group, the possibility of its later division into formations is implied.

- (3) *Recognition of the same formation in different areas is only justified when its essential lithological definition is applicable.* Naturally, some variation in lithology is permissible, but a formation must continue to be definable in terms of the dominant kind or kinds of rocks that compose it in its type section or area. If, for example, a limestone formation is proved to interdigitate with or grade into shale, the latter must be regarded as representing another formation, but the boundaries between it and the limestone may have to be chosen arbitrarily.
- (4) *The upper or lower contacts of a sedimentary formation may transgress laterally horizons of neighboring formation.* Where this occurs, and so long as the lithological identity of the formation is retained, the formation continues to bear its original name. Where, however, a formation, due to a lateral variation in thickness, becomes too thin to be of itself ordinarily selected as a formation, it may be incorporated as a member of another formation.
- (5) *The top and bottom of a sedimentary formation are defined either by a change in lithology or by evidence of an appreciable interval of non-deposition.* In a gradational series the passage beds from one formation to another may be sufficiently distinctive and extensive to be considered as separate, intervening formations.
- (6) *A formation may hold one or more faunas or floras.* Lithology, not paleontology, defines the vertical limits of formations except as indicated in 1, above.
- (7) *A sedimentary formation may include minor developments of volcanic rocks, provided these cannot be recognized as marking an appreciable interval in the process of sedimentation, and provided they are not regarded as integral parts of the formation.*
- (8) *Pryoclastic materials, whether deposited in water or on land, are to be regarded as volcanic sediments and, hence, as constituents of sedimentary formations.*

Prepared for the Commission by **RAYMOND C. MOORE**, chairman

NOTE 4—NAMING OF SUBSURFACE STRATIGRAPHIC UNITS¹

AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

The following statements relative to nomenclature of subsurface stratigraphic units and supplemental discussion have been submitted by **WAYNE V. JONES** and accepted by the Commission for study. In due time, pronouncement of the Commission's opinion or other actions in reference to the problem here presented may be expected. Publication of this Note is made for the purpose of inviting discussion and expressions of judgment from interested geologists everywhere. Members of the Commission desire to give attention to the viewpoints of workers concerned with subsurface stratigraphy in many areas, particularly in cases where recommendations made in **JONES'** proposals seem undesirable for adoption. Communications intended for the Commission should be addressed to its chairman, **RAYMOND C. MOORE**, University of Kansas, Lawrence.

A period of ninety days following the date of publication of this Note is set for receiving correspondence which may be helpful to the Commission in reaching decisions on the subject of subsurface stratigraphic nomenclature. Thereafter, the chairman will arrange for expeditious transmittal of communications to the several Commissioners and study leading

¹ See footnote accompanying Note 3, preceding.

to formulation of Commission action will be undertaken. If the problem can be resolved satisfactorily without holdover to the annual meeting, publication of the Commission's action can be initiated promptly after a majority decision is reached.

SUMMARY

1. Subsurface units have increased in number and importance and have outgrown the provisions for their naming as set up in the stratigraphic code formulated in 1932. Revisions of the code are proposed that liberalize the conditions under which it is proper to name a subsurface unit and at the same time make the rules more definite and stringent for naming it properly.

STATEMENT OF PROBLEM

2. Substantial advances in subsurface geology since the formulation of the code on Classification and Nomenclature of Rock Units in 1932 (ASHLEY *et al.*, 1933, 1939) call for amplification and clarification of the provisions in that code which have to do with the naming of subsurface units.

FACTS PERTINENT TO PROBLEM

3. Subsurface units have attained a stature nearly equivalent to that of surface units during the past fifteen years, for deep drilling has extended knowledge of subsurface formations very substantially. Many of them now are seen to undergo important changes of facies and to become very dissimilar from their surface equivalents. Others fail to reach the surface.

4. Considerable advances in micropaleontologic and microlithologic knowledge have been made and more accurate well logging methods have come into use, with the result that subsurface formations now are studied and analyzed with a degree of precision that was impossible fifteen years ago.

5. In areas of poor outcrops it is not uncommon for subsurface units to be understood better and to be defined more precisely than their surface equivalents.

CONCLUSION

6. Revision of the code is needed in order to give adequate recognition to the increased importance of subsurface units and to set up a more up-to-date and detailed set of rules for naming them.

RECOMMENDATIONS

7. It is recommended that the Commission revise portions of Articles 7, 8, and 14 and that it rewrite Article 17 of the code on the Classification and Nomenclature of Rock Units, to read as follows.

Article 7. [Formation names] . . . *Remarks.*— . . . (c) [Sources of names for surface and subsurface stratigraphic units.] Names of natural features, or of political subdivisions, or of towns of consequence are generally preferable because less changeable, to names of very small or, particularly, unincorporated towns. Names derived from evanescent sources such as the ownership of farms or ranches, churches, crossroads communities, etc. are objectionable but such names are permissible if no others are available. It is desirable that the sources of all names for formations or more important units be of such a nature that they can be found in an ordinary first class atlas. If names are used which do not meet this test, the precise legal description of the place from which the name is derived shall be given.

Names for subsurface units may be designated in the manners set out above. In addition, names of oil or gas fields and farm names of wells also may be used. If they are so

used, as a general rule, names for formations or more important units shall be derived from the names of fields, rather than from the farm names of wells. The objection to farm names expressed in the preceding paragraph does not apply in the case of subsurface units, since the evanescent nature of the name of the type locality will make little difference in view of the fact that there will be no need to visit the type locality.

Article 8.—[Explicit definition of new formation names.] . . . *Remarks*.— . . . (c) [New] For special rules with regard to naming subsurface units see Article 17.

Article 14.—[Designation of subdivisions of formations.] . . . *Remarks*.—The proper designation of these lesser units rests largely upon the accidents of exposure and upon the amount of pertinent available subsurface data. All surface and subsurface data should be considered in determining the proper designation.

Article 17.—[Rewritten.] Subsurface units may be given formal names when such names are necessary for adequate presentation of the geologic history of the region or when the subsurface section is materially different from equivalent exposed beds.

Remarks.—(a) Subsurface units, recognized and named from well logs, including sample logs, core records, and electrical and other mechanically recorded logs, with the assistance of paleontological determinations differ from surface units in that the "type locality" cannot be visited and restudied from time to time by subsequent workers. With the advent and wide dissemination of the electrical log and the systematic saving of representative well cuttings, particularly in areas of deep drilling, it frequently has become possible, in recent years, to bring the "type locality" into the office or laboratory of any truly interested worker. In fact, the log portion of the "type locality" can and should be published. This condition lessens the need for restricting the number of names of subsurface units to an irreducible minimum. If a subsurface type section is definitely better and more typical than that available at any surface type locality, the subsurface section may be designated as type. Otherwise, a surface type locality shall be designated.

(b) Names applied to subsurface units shall be governed by the same restrictions and regulations as prevail for exposed units. (See Articles 7, 9, 10, and 11.)

(c) When it becomes possible to correlate a named subsurface unit with a named surface unit, and when the surface and subsurface facies are sufficiently similar that two names are unnecessary, the name of the surface unit is to be applied, even though the subsurface name has priority, unless much more extensive usage of the subsurface name renders its retention preferable or necessary.

(d) When beds are discovered which are equivalent and in similar facies to a named subsurface unit, the name of the subsurface unit shall have priority.

(e) When it is found that a subsurface unit has been named for but miscorrelated with a named surface unit, a new name shall be given the subsurface unit or it shall be renamed for its true correlative on the surface. In rare instances, exceptionally widespread use of the name by the subsurface unit may make it advisable to permit the "pirating" of the name by that unit and thus force the renaming of the surface unit from which it derived its name. Such "pirating" should be held to a minimum and should be accepted for publication only after a favorable ruling by the American Commission on Stratigraphic Nomenclature.

(f) In proposing a new name for a subsurface unit, it is desirable to describe for the type section the following features:

(1) Location of the type locality well; name of operating company or individual; date of drilling; results and present status of the well; elevation of surface at the well and depths to top and bottom of the new unit.

(2) If all data needed to establish the type section properly cannot be furnished from one well, two or more wells shall be used and the data called for under (1) shall be furnished for each well so used.

(3) As complete a section as possible shall be described in detail from cores of the new

unit. Where sample logs are available, critical portions of them shall be included in written or graphic form or both. The boundaries and subdivisions, if any, of the new unit shall be indicated clearly in these logs and core records.

(4) Where electrical or other mechanically recorded logs are available, the critical parts of such logs, preferably of several wells located in a single area, shall be published in the article proposing the new named unit. The boundaries and subdivisions, if any, of the new unit shall be marked plainly on these published logs, which shall be on a scale large enough to permit full appreciation of all details of the new unit.

(5) Fauna and flora. Diagnostic fossils of the new unit shall be described in detail and, if possible, figured. Description and figuring of diagnostic fossils are essential if the new unit is a time-rock unit.

(6) Nature of underlying and overlying units.

(7) Correlation and position in the general stratigraphic scale.

(8) Present location of the cuttings or samples.

(9) Present location of the fossils.

(10) Critical parts of written drillers logs of all wells used, unless these are considered to be so inaccurate that their inclusion would be confusing.

(g) The cuttings and the fossils, accompanied by copies of all available types of logs should be placed in some official, permanent depository. As a rule the appropriate state geological survey will serve as such a depository.

(h) The editorial staffs of all publishing agencies are urged to insist that the provision of this Article be followed in detail whenever a subsurface unit is being given a name.

DISCUSSION

8. The amplification and alteration of remarks (c) under Article 7, as proposed, is for the purpose of bringing the code into line with prevalent usage, which, to a considerable degree, has established the desirability of the proposed changes. The first paragraph alters slightly the present general provision regarding sources of names. It endeavors to set up more definite provisions requiring precise locations of type localities. The second paragraph is new and takes cognizance of the fact that the sources of names for subsurface units are, of necessity, somewhat different from those for exposed units. Present usage approximates the provisions of this paragraph even though the existing code is somewhat in conflict with it.

9. The addition to the remarks under Article 14 scarcely needs discussion. The need for the addition of the subsurface viewpoint is obvious the moment attention is called to the matter.

10. The changes in Article 17 constitute the principal subject matter of the present submission. It is the dual purpose of this revision to liberalize the conditions under which it is proper to establish subsurface units and at the same time to provide more stringent requirements to the end that they will be properly established. The proposal increases the relative importance of subsurface units as compared with exposed units but still does not put them on an equal basis. It is recognized that there are fundamental reasons to prevent the establishment of too many subsurface units and for this reason, the proposal has been tempered to leave the exposed units in a dominant position. On the other hand, it is necessary that adequate provision be made for subsurface units which have no exposed correlative or which are correlative with exposed units that are only remnants of the subsurface section, or that are substantially different in facies. The proposed changes are an evolutionary step between the original complete dominance by exposed units and possible eventual complete equality of the two types of units. Exactly how great a step is needed at this time is a matter for the Commission to decide and one on which there probably will be considerable diversity of opinion.

11. Remarks (c), (d), and (e) of Article 17 are suggested as ways of handling various

types of conflicts in nomenclature that have arisen and undoubtedly will continue to arise. It is very difficult to establish rules in these connections to which there will be *no* exceptions. Following historic precedent, the rules proposed give chief weight to exposed units and to priority, but there are times when usage must take precedence for the reason that to do otherwise only perpetuates confusion. As a result, exceptions are provided for in both paragraphs (c) and (e). Paragraph (c) is rather similar to the existing provision but provides for possible exceptions. Paragraphs (d) and (e), however, are entirely new and should be considered carefully by the Commission. Whether or not the proposed rules are acceptable to the Commission, some rules to cover these situations should be adopted. The exception provided for in (e) is probably the most controversial point proposed. There is at least one such condition presently existing which involves units of major importance. The principal oil-producing formation in the Texas Gulf Coast is the Frio with its many sands. It was named for the outcropping Frio formation of the South Texas region, with which it supposedly was correlative. Subsequent information, however, suggests that the Frio of the subsurface is younger than that of the outcrop and actually correlative with younger outcropping beds. Due to the commercial importance of the subsurface Frio, there is a vast amount of published technical and statistical data regarding it. Usage of the term Frio in its subsurface sense so predominates over usage in the surface sense, however, as to fix firmly the usage in the subsurface sense. Under present rules of nomenclature, it is practically impossible to correct such a condition, with the result that no one has seen fit to try. Due to the comparatively minor importance of the term Frio in the surface sense, a concerted effort by interested geologists could change the name with reasonable speed and ease, particularly if they could prove their point and obtain backing by a group such as the Commission. The provisions of paragraph (e) are designed to provide machinery to handle such a situation.

12. Remarks (f) under Article 17 proposes complete rules for naming a subsurface unit and for designating its type locality. Most of the provisions are self-explanatory and their desirability should be evident. In the past, few articles which have named subsurface units have contained all of the material called for by this paragraph. As a result, its adoption should result in an improvement in the naming of such units.

13. Remarks (g) is a provision which needs implementing. At present an author might have considerable difficulty in finding a proper agency willing to act as a depository. The desirability of depositing the data with some official agency is apparent, but some missionary work probably will have to be done in order to make it possible.

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—, 1939, "Classification and nomenclature of rock units," *ibid.*, Vol. 23, pp. 1068-88.

Prepared for the Commission by WAYNE V. JONES, and RAYMOND C. MOORE, *chairman*

COMMENT

A majority of emendations here advocated by Mr. JONES relate to parts of the Stratigraphic Code that are classed as Remarks accompanying the Articles. Many such Remarks are obviously in the nature of interpretation or illustration and lack force as rules; others are in the nature of supplementary injunctions or amplifications of the Article to which they are appended. It seems inappropriate to treat Remarks as other than purely interpretative comment. Revision of the Code should differentiate between major declarations or injunctions and subordinate ones, and statements treated as Remarks desirably should be set apart clearly as supplemental rather than integral segments of the Code.—RAYMOND C. MOORE.

NOTE 5—DEFINITION AND ADOPTION OF THE TERMS
STAGE AND AGE¹

AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

In September 1947, proposal was made to the Commission by RICHARD FOSTER FLINT, of Yale University, that the terms stage and age should be defined in manner differing from that given in the Stratigraphic Code (ASHLEY *et al.*, 1933, 1939) and should be adopted with meaning to agree with that accepted by the International Geological Congress and used by a majority of stratigraphers. A revised statement of this problem was written by the Commission chairman and forwarded to Mr. FLINT, who made minor changes in the draft and has submitted it as here published. The Commission has expressed readiness to study the questions raised and to formulate an opinion. If recommendations are followed, revision of the Stratigraphic Code is called for.

The chief, if not only, divergent use of stage from that adopted by the International Geological Commission has been among American glaciologists in writing about the Pleistocene Epoch. They have used stage as a time term. It is appropriate to notice that proposal to abandon this usage in favor of stage as a time-rock term is offered by one of the leaders in Pleistocene research.

Publication of this Note will serve to inform geologists concerning the proposals, and the Commission invites comment from those who endorse or oppose the recommended actions or who favor modification of the suggested actions. Communications concerning definition and adoption of the terms stage and age should be sent to RAYMOND C. MOORE, University of Kansas, Lawrence. Ninety days after the publication date of Note 5, the chairman will prepare and transmit to members of the Commission such materials pertaining to this problem as may have been sent to him.

SUMMARY

1. Use of the term *stage* by geologists of North America has been divergent and conflicting. This term has been used by some as a time unit term having general applicability; it has been used by others in accordance with implied provisions of the Stratigraphic Code as a time unit term having applicability only to the Pleistocene; still others employ the term stage as a time-rock unit in the sense adopted by the International Geological Congress, applying to part of a series. It is recommended that the Stratigraphic Code be revised so as to recognize stage as a time-rock unit only, and to define age as the time unit corresponding to stage.

STATEMENT OF PROBLEM

2. Discrepancy exists between use of the term *stage* by some American geologists and geological organizations and that adopted by the International Geological Congress, which is accepted by other geologists and geological organizations in North America and abroad. On the one hand, this word is used as a unit of geologic time, and on the other it is applied to rocks as a time-rock unit. The problem of abating this conflict in usage is presented. As a corollary, adoption of the time term *age* is introduced for consideration.

OBSERVATIONS PERTINENT TO THE PROBLEM

3. The 2nd International Geological Congress (Bologna, 1881) adopted recommendations of a commission appointed by the 1st Congress (Paris, 1878) for the purpose of formulating a uniform scheme of stratigraphic classification and terminology of units (DELAIRE

¹ See footnote accompanying Note 3, preceding.

& FONTANNES, 1881). The adopted names for time units, in descending order of magnitude, are: (1) era, (2) period, (3) epoch, (4) age. Time-rock units corresponding to these are: (1) group, (2) system, (3) series, (4) stage. A subdivision of stage, termed *assize*, was adopted without designation of a corresponding time term.

4. The 8th International Geological Congress (Paris, 1900) reaffirmed adoption of most of the units cited above but made some changes, as follows (RENEVIER, 1901). Time units: (1) era, (2) period, (3) epoch, (4) age, (5) phase. Time-rock units: (1) —, (2) system, (3) series, (4) stage, (5) zone.

5. Most geologists and geological organizations outside of North America, as well as many geologists and geological organizations on this continent, have consistently employed terminology adopted by the Congress. Representative references to publications in which *stage* is employed as a time-rock term and *age* (if mentioned) is used as the corresponding time term are: GEIKIE (1903, p. 860), LAPPARENT (1906, p. 720), CLELAND (1916, p. 383), KAYSER (1923, p. 10), GRABAU (1924, p. 1104), SCHAFER (1924, p. 51), DIENER (1925, p. 215), MILLER (1929, p. 37), PIA (1930, p. 69), BLACKWELDER (1931, p. 869), GREGORY & BARRETT (1931, p. 17), KAY (1931, p. 448), TESTER (1931), SCOTT (1932, p. 26), ARKELL (1938, p. 33), KAY & LEIGHTON (1933, p. 673), GIGNOUX (1936, p. 17), KLEINPELL (1938, p. 87), CASTER (1934, p. 16, chart opp. p. 63), SCHENCK & MULLER (1941, p. 1421), MULLER (1941, p. 1431), COOPER *et al.* (1942, chart), STEPHENSON *et al.* (1942, chart), SCHUCHERT (1943, p. 10), KAY & GRAHAM (1943, p. 13), HOWELL *et al.* (1944, chart), IMLAY (1944, chart), MOORE *et al.* (1944, chart), WEAVER *et al.* (1944, chart), FLINT (1947, p. 209).

6. Some American geologists and geological organizations have used *stage* as a time term, although (with minor exception) such use has been confined to subdivisions of Pleistocene time. Representative references to this usage are: CHAMBERLIN (1895), CALVIN (1897), LEVERETT (1898, 1899), SHIMEK (1909), LEVERETT & TAYLOR (1915), ALDEN & LEIGHTON (1917), SARDESON (1926), KAY & APFEL (1928). Employment of *stage* as a generally applicable time term indicated by SCHUCHERT & DUNBAR (1933, p. 72) and by MOORE (1933, p. 54) but was rejected by them subsequently. However, SUTTON (1940, p. 1400) advocates such use still.

7. The Stratigraphic Code (ASHLEY *et al.*, 1933, p. 429; 1933a, p. 849; 1939, p. 1074), recognizes *stage* only as a time term. Article 2 (7) under *Remarks* states "... in America this term (*stage*) has almost no usage other than as a time term for major divisions of the Pleistocene epoch—for example, Wisconsin glacial stage, Yarmouth interglacial stage." The Code (*ibid.*, 1933, p. 346; 1933a, p. 862; 1939, p. 1087) also states: "By long continued custom in the United States, the time covered by a Pleistocene subdivision of formational rank is called a *stage* . . ." This usage is noted by CHENEY *et al.* (1945, p. 137), with implied acceptance of it.

8. The Stratigraphic Code (ASHLEY *et al.*, 1933, p. 445; 1933a, p. 862; 1939, p. 1087) does not recognize *age* as a time unit term. Article 24 (3) states that "The following divisions of geologic time are recognized . . . Epoch, a subdivision of a period. The term is applied primarily to a major subdivision, but it is likewise used for any subordinate unit except for the subdivisions of the Pleistocene epoch . . . Remarks (c) Various terms have been proposed for lesser subdivisions of geologic time . . . for example, *subepoch*, *age*, and *phase*. These three have found little acceptance in America, for *epoch* and the somewhat indefinite term *time* have seemed to answer satisfactorily for all units subordinate to period."

CONCLUSION

9. The terms *stage* and *age* are useful time-rock units and time units, respectively, having rank next below series and epoch. They are now very widely recognized as useful elements in stratigraphic classification and nomenclature. They are applicable to Pleisto-

cene deposits and time, just as to older parts of the geologic record, and all possible means should be taken to avoid discrepant usage.

RECOMMENDATIONS

10. It is recommended that the Commission adopt such revisions of the Stratigraphic Code as will provide for recognition of *stage* and *age* as time-rock and time classificatory units having applicability to all parts of the geologic record, including Pleistocene, that yield requisite basis for differentiation.

DISCUSSION

11. At least four arguments may be advanced in favor of doing away with discrepancy in usage of the term *stage* by American geologists:

- (a) Maintenance of special usage (1') in a single country and (2') with reference to only one of the major subdivisions of the geologic column, is confusing, awkward, and unnecessary.
- (b) The special usage of stage for divisions of Pleistocene time seems to have grown up through custom rather than to have foundation in logic.
- (c) The usage of stage adopted by the International Geological Congress is as easily applied to Pleistocene deposits as to pre-Pleistocene parts of the geologic column.
- (d) Some geologists in America who have specialized in the study of Pleistocene geology favor the use of *stage* in a manner conforming essentially to that of the Congress and they have adopted this usage. Among such Pleistocene workers are: KAY (1931), BLACKWELDER (1931), KAY & LEIGHTON (1933), KAY & GRAHAM (1943), FLINT (1947).

12. Adoption of the time unit *age* in a sense corresponding to the time-rock unit *stage* is judged to be desirable for the following reasons:

- (a) This usage conforms to classification adopted by the International Geological Congress. Acceptance of it by American geologists makes for uniformity of usage and avoids needless discrepancy in terminology.
- (b) If use of the term *stage* is restricted to a time-rock unit, a correlative time unit term is required.
- (c) Use of the term *epoch* for time corresponding to a series and for time corresponding to any subdivision of series is judged incongruous. This is conducive to loose terminology, if not to confusion.
- (d) Several geologists of North America, including Pleistocene specialists, have already adopted *age* for the time corresponding to a *stage*, and this usage is prevalent abroad.

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Prepared for the Commission by RICHARD FOSTER FLINT, and RAYMOND C. MOORE,
chairman

NOTE 6—DISCUSSION OF NATURE AND CLASSES OF STRATIGRAPHIC UNITS¹

AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

INTRODUCTION

Among letters that have been addressed to the Commission are expressions of viewpoints with respect to definition of the nature and classes of stratigraphic units, which are judged to have general interest. These discussions are published here in order that they may be available to all. The Commission welcomes and solicits from geologists both expression of opinions, supported as may be desired by factual observations and argument, on any problems that have been placed before the Commission, and presentation of requests for formulation by the Commission of formal Opinions, Declarations, or Recommendations involving definition, clarification, or application of stratigraphic principles. The arrangement, introduction of headings and some editorial changes in preparing this Note are a responsibility of the Commission chairman.

DISCUSSION BY JOHN RODGERS²

I have read with great interest the two notes of the American Stratigraphic Commission that appeared in the March number of the Bulletin of the American Association of Petroleum Geologists. In studying Note 2, a line of reasoning came to my mind that stems from my actual practice in the field in defining and using formations in areal mapping, and I venture to put it down on paper as a contribution to the discussion of this vital matter.

Essential features of rock units.—I am wholly in agreement with the recommendation in Note 2, and believe it essential that the rock units—preëminently formations—be defined solely as *lithologic* units, using lithologic in as broad a sense as possible and demanding that the lithologic criteria be as objective as possible. I do feel however that the other term in the definition also needs stressing, namely the idea of a formation as a *unit*, a genetic unit (see the Code, Article 5; also SCHENCK & MULLER, 1941, who term it a lithogenetic unit). Of course genetic units can rarely be completely objective, but on the other hand the genetic idea introduces a basis for selection among the possible objective criteria by which the formation may be defined.

In deciding on formation boundaries, one is commonly faced with a number of lithologic features, and the criteria for the boundary must be chosen from among those features. It is not enough to say, I think, that one should select the "striking" or "obvious" features; first, there can be no objective determination of which ones are more striking or more obvious, and second, experience shows that the more obvious changes are often less useful than less obvious ones. Selection has to be made on one of two grounds, which I believe generally coincide: that is, on the usefulness of the separation for the purposes of the geologist, who is usually mapping the geology or describing the geologic history, and next, on the genetic importance of the criteria. The two generally coincide, and the genetically important criteria are the most useful ones for almost any geological purpose whatever.

¹ See footnote accompanying Note 3, preceding.

² Yale University; also U. S. Geological Survey. The discussion here given is taken from a letter (undated) to R. C. MOORE.

If then, in selecting lithologic criteria by which to define a formation, we prefer genetically important criteria, we should strive to select those that will make formation boundaries as nearly time lines as possible. I do *not* mean by this that the formations should be *defined* by time; they should be defined by lithology, but the effort should be made to choose those lithologic criteria that make the formations more nearly time-stratigraphic units. In other words, we should choose the lithologic criteria that prove to be the most traceable laterally. In many instances this will lead to defining formations less by gross lithology than by key beds (lithologically recognized, of course).

Cambrian rock units of the southern Appalachian region.—Note 2 presents a diagram of the Middle and Upper Cambrian rocks of the southern Appalachians, with which I happen to be familiar, and I will therefore use it to illustrate my point.

At the bottom of the chart is the Rome formation, which is defined on the basis of sandy and silty layers in heterogeneous sequence, contrasting with all of the overlying formations; these are more uniform and include little or no sand or silt. The bulk of the Rome formation falls in the Lower Cambrian Series, and *Olenellus* has been found practically at the top in Virginia in certain areas where the Rome is overlain by Honaker (or Elbrook) dolomite (left-hand side of diagram). On the other hand, Middle Cambrian fossils are known from the Rome in other areas in Tennessee and Virginia where the Rome is overlain by the Rutledge limestone or the Conasauga shale (right-hand side of diagram). This has led to several suggestions.

RESSER, in describing Middle Cambrian fossils from what had been mapped as Rome on the basis of lithology, said that the fossils were Rutledge types and therefore that the beds containing them (sandy shales) should be included in the Rutledge formation.

This is wholly unacceptable to anyone who believes, as I do, in lithologic formations. I was able to show, in an area where the Rutledge limestone overlies the Rome, that the upper 380 feet of what had been mapped as Rome is lithologically distinct from the main body of the Rome; it contains only sandy and silty shale and thin siltstone layers and is green or olive in color, whereas the Rome below contains thick sandstones and the silty and shaly layers include much purple and red. A boundary could therefore be drawn at the top of the typical Rome lithology and could be mapped; I mapped it for 30 miles along that strike belt and have recognized it in other belts. Fossils collected from the new unit are basal Middle Cambrian; in the restricted Rome *Olenellus* occurs and nothing higher is known. I therefore am proposing, in a paper describing a long measured section which will be published by the Tennessee Division of Geology, that the upper part of the former Rome be separated as an independent formation and given a new formation name. I believe that the base of this new formation approximates the time line between the Lower and Middle Cambrian Series, although the nearest fossils on either side are about 150 feet away stratigraphically; nevertheless I am *defining* the new formation entirely on objective and lithologic criteria.

Stratigraphic units of the "Knox dolomite."—Another example occurs at the top of the same chart in Note 2. The Copper Ridge dolomite on the northwest side of the Valley of Tennessee is overlain by 1,600 or more feet of dolomite with a few beds of limestone in the upper part; the whole constitutes a gross lithologic unit and has been mapped as the Knox dolomite since the days of SAFFORD (1855).

Dr. E. O. ULRICH showed that the Knox unit contained several distinct faunas ranging from middle Upper Cambrian (his "Lower Ozarkian") to upper Lower Ordovician (Upper Canadian). Accordingly, he divided it into several "formations," but the units, as he defined them, cannot be traced and mapped and are not lithologic units.

JOSIAH BRIDGE, however, working with an intimate knowledge of the faunas but also doing careful mapping based on lithology, was able to divide the Knox dolomite into five distinct formations, which have been mapped successfully by quite a number of us down in that area on purely lithologic distinctions, such as key sandstone beds and differences in

the chert found in the residuum. BRIDGE so chose his boundaries that one of the lithologic units coincides with the Upper Cambrian part of the dolomite (Copper Ridge dolomite; the name is ULRICH's but originally included a much greater thickness because of incomplete collecting), and the others coincide with four faunal zones in the Canadian part (roughly the faunas of the Gasconade, Roubidoux, Jefferson City, and Cotter, we believe).

If BRIDGE had chosen lithologic units on the basis of the most obvious changes in the section, especially the change from limestone to dolomite, the resulting units would not have coincided with faunal units and would, I believe, have been far less satisfactory, even purely from a mapping viewpoint, though somewhat easier to recognize at first. Actually, one of BRIDGE's lines runs through the middle of the zone of limestone, separating one thick zone of limestone containing Jefferson City fossils, above, from an alternation of thin limestone and dolomite layers containing Roubidoux fossils (*Lecanospira*), below. This line was chosen because it separated the two faunas, but also because it was mappable, and it has proved to be mappable on purely lithologic grounds over a considerable area.

Selection of formation boundaries.—Formations must and should be defined on the basis of lithologic characters (using lithology in a broad sense, of course), but stratigraphers should try to pick those characters that result in the formations (and their boundaries) being traceable, being as nearly contemporaneous as feasible, and corresponding roughly, if practicable, to faunal units (and faunal breaks). I believe that commonly at least such characters can be found.

On the other hand, I recognize that there are sections in which such a procedure is not feasible; one need only refer to the Monterey shale of California, as shown for instance in the stratigraphic diagrams in BRAMLETTE's recent Professional Paper, to see that some natural and genetic units entirely disregard time and that to apply my suggestion to such rocks is to force the facts into an ill-fitting strait jacket. I believe, however, that in many other sections and areas, the search for traceable and approximately contemporaneous boundaries roughly coincident with faunal breaks will lead to more "natural," more genetic formations, than the use of gross lithologies.

DISCUSSION BY W. W. RUBEY³

A batch of papers relating to the American Commission on Stratigraphic Nomenclature forwarded to me in the field, includes a copy of your letter regarding lithologic, faunal, and time units, which I have read with much interest. As I would have expected from our numerous discussions, I am in complete agreement with you on most of the major points mentioned in your letter. But on one point, if I understand you correctly, I am surprised to find myself in pretty definite disagreement with you.

Formations as genetic units.—I am in complete accord with you when you say that the idea of the formation as a genetic unit deserves emphasis, but from then on you seem to use genetic unity as though it meant approximate sameness in age, rather than approximate sameness in conditions of deposition.

A word about what degree of genetic unit we are talking about before I go further: As you say, the idea of genetic unity involves subjective elements because there are almost endless degrees of genetic unity in rocks and because stratigraphers and sedimentologists do not yet understand the differences in genetic significance of many readily distinguishable types of sedimentary rocks. When we finally unravel the significance of these first, second, and third order differences in composition, texture, etc., the ultimate genetic unit

³ Commissioner representing U. S. Geological Survey. The discussion here given comprises excerpts from a letter dated August 4, 1947 written by W. W. RUBEY from his field camp in Wyoming to JOHN RODGERS. A few headings have been inserted by R. C. MOORE. Published with the permission of the Director, U. S. Geological Survey.

may still be a will-of-the-wisp that has retreated to the *presumed* annual layer that was formed under *approximately* uniform conditions of deposition. Nevertheless, you and I and our colleagues are interested in the stratigraphic problems of today rather than those of the year 2947, and we are all in substantial agreement about the order of magnitude of what we would include within a so-called "genetic unit" today. This paragraph may be quite unnecessary here because your proposal shows that you have in mind approximately the same degree of genetic unity that I have. Nevertheless, it is possible to quibble endlessly about the exact meaning of "genetic units," and I have written this just to make clear what I do not mean by the term.

Relation of time units and rock units.—Now to go on: If, as some have said, geology is the study of the composition and history of the earth, then time-lines and environmental units are equally important in deciphering the complete geologic record. I can see no basis for any real conflict regarding the relative importance of time-lines and lithologic units. Either one of these two types of information is meaningless unless it is supplemented by the other. The more we learn about the extent or origin of any environmental or lithic unit, the surer we are to find that it transgresses time-lines significantly somewhere.

Platitudes, yes, but they add up to a conviction on my part that we only fool ourselves by over-simplification if we try to make our formation boundaries as nearly time-lines as possible. I have worried a good deal about your recommendations that we choose key beds rather than gross lithology in establishing formations. In all the examples I know about where we have a choice between the two, I would certainly choose gross lithology rather than key beds as a basis for approximation to the concept of genetic unity.

Example from the Montana-Wyoming Cretaceous.—You cited examples from the Cambrian of the southern Appalachians. Permit me to illustrate my point with an example from the Cretaceous of the Great Plains country. In the general Black Hills region, the Belle Fourche shale contains numerous thin bentonite beds and is overlain by the Greenhorn limestone. In southeastern Montana and extreme northeastern Wyoming, BRAMLETTE and I found that the yellow-weathering chalk marls and thin limestones of the Greenhorn thicken eastward from 60 feet to 355 feet at the expense of the underlying black, fissile, non-calcareous shale of the Belle Fourche. The precise relations are demonstrated neatly by several thin bentonites that are individually recognizable in the upper part of the Belle Fourche shale to the west and in the lower part of the chalk marl of the Greenhorn to the east. The boundary between the black shale and the chalk marl is distinct and the interfingering tongues are individually mappable on a scale of one inch to the mile.

If I understand your letter, you would recommend using the individual bentonites as key beds for formation boundaries rather than the gross lithology of black shale versus chalk marl and limestone. For the life of me, I cannot see that you would gain a thing thereby. Surely the lateral change from chalk marl to black shale deposition is an essential part of the geologic record for that section of the country. If, as I think likely, it marks the western boundary of a warm current in the Cretaceous sea, it may also have broad significance in the geologic history of the interior Cretaceous, but whichever criterion (gross lithology or bentonite beds) is used for establishing formation boundaries here, the other information must also be shown to give the complete geologic picture.

For purposes of defining map units the gross lithology recommends itself to me because it is the traditional basis for separating Belle Fourche from Greenhorn, because it is more widely exposed than the individual bentonites and is therefore more widely useful for mapping purposes, and because gross lithology corresponds closely to something the layman can understand about a geologic map.

The other alternative is admittedly possible: several formations, each made up of black shale to the west and chalk marl to the east, could be established and probably

mapped by using the several individually recognizable bentonite beds as formation boundaries. But if there would be any advantage, either theoretical or practical, in choosing formations on this basis, I have somehow missed it.

I have expanded on this example of the Belle Fourche and Greenhorn because it is the clearest one I know where we have the choice of gross lithology or key beds. However, I could cite other examples and state my reasons for preferring gross lithology as a basis for formation boundaries when differences in gross lithology are too subtle for ready recognition.

FURTHER DISCUSSION BY JOHN RODGERS⁴

Gross lithology vs. key beds.—I am inclined to think that the distinction between our points of view, which can be expressed perhaps as gross lithology vs. key beds, is a real one, though the gap is not large or unbridgeable. You have shown quite clearly that in trying to make my point, I was guilty of overemphasizing it, and I hasten to expand the disclaimer in my last paragraph to read: There are undoubtedly many sections in which the key-bed procedure is not feasible.

But I still maintain that there are some sections where the attempt to use gross lithologies to define formations leads only to trouble. I cited the example of the Knox group (Upper Cambrian and Lower Ordovician) in Tennessee.

Another example, if I have read the literature aright, is in the Stanley and Jackfork formations of the Ouachita regions, which have recently been subdivided on the basis of key beds.

If I may return again to the Appalachians, another fine example is in the Lower Cambrian clastic sequence in northeast Tennessee recently described by several of us under the leadership of P. B. KING (Tenn. Div. Geology Bull. 52, 1944). When we first went into that area, we were plagued by our inability to find the three formations we had been told to expect: the Unicoi "conglomerate," the Hampton shale, and the Erwin quartzite. The section actually consisted of a large thickness of nearly uniform silty shale and sandy siltstone with zones of quartzite and conglomeratic quartzite layers of varying and more distinctive character. We went ahead and mapped the rocks we saw, and we found that some at least of the quartzite and conglomeratic quartzite layers were traceable, so we traced them. But we argued incessantly about what formations to use, and it was not until the field work was three-quarters done that we finally realized that our difficulty was in looking for non-existent shale and quartzite formations. As soon as we gave up looking for gross lithologies and agreed to define our formations on key beds, our troubles were over. Yet the units we finally accepted are perfectly good mappable units, defined on lithology; only they require somewhat more work from the geologist than if he had nice clean-cut gross-lithologic units to work with.

Again let me repeat that I do not mean to imply that key beds are always to be used, or even most of the time or half of the time; I admit I gave that impression in my first letter and you quite properly called me down for it. But I still believe that there are some cases where key beds work best, and I seem to have run into a disproportionate number of them.

Definition of formations on lithologic basis.—Finally I think we are in agreement on what is probably a more fundamental point: we agree that the formation should be defined by lithology, not by time. And also that probably the ultimate criterion of the value and usefulness of a formation is not the abstract concept of "ultimate genetic units" but usefulness to the field geologist in mapping or describing the geology and geologic history of the area in which the formation occurs.

⁴The following discussion comprises parts of a letter to W. W. RUBEN dated September 17, 1947.

DISCUSSION BY M. N. BRAMLETTE⁵

Need for clear distinction between classes of stratigraphic units.—The necessity of making an unequivocal distinction between lithologic units and those related to divisions of geologic time is particularly obvious in dealing with the Tertiary rocks of California, and of these rocks in many other regions. Even the Cretaceous strata do not everywhere behave so well as in the Rocky Mountain country, however, nor is all the Paleozoic exempt from unruly habits. It seems inevitable, moreover, that identical problems, though on a lesser scale than those of the super-colossal features of California, will become increasingly important with the continued refinements in stratigraphic investigations.

Rodger's views on definition of stratigraphic units.—I am interested in the letter from John Rodgers as it expresses well a reasonable viewpoint that includes, however, a concept that is all too common among stratigraphers and many other field workers. The units that he and associates were mapping in the Knox dolomite seem, in part at least, actually to be some such units of the time stratigraphic scale as Zones or Stages, even though there are some persistent key beds that offer assistance in following out these units. Where such a key bed is unexposed or faulted out, the distinction would necessarily rest entirely on fossils, rather than the lithology, as with all time stratigraphic units. True enough—such units are more important to many problems in geology than the distinctive but often less persistent lithologic units, and to show them on a map, where possible, may be quite as important. Nevertheless, the formation is by generally accepted definition a lithologic unit, and to the engineer, the soil scientist, and to the geologist in many of his problems, it is essential that these strictly lithologic units be shown on the map regardless of the lack of persistence or varying age relations. His splitting off of a lithologically distinct member or formation from the upper part of the Rome formation is, on the other hand, in line with thorough stratigraphic work and seems to involve no conflict with the principles of classification under consideration.

Prepared for the Commission by RAYMOND C. MOORE, *chairman*

⁵ University of California, Los Angeles. Commissioner representing the Geological Society of America. The discussion is taken from a letter to R. C. MOORE dated August 8, 1947.

REVIEWS AND NEW PUBLICATIONS

* Subjects indicated by asterisk are in Association library, and are available, for loan, to members and associates.

THE GEOLOGY OF VENEZUELA AND TRINIDAD, BY RALPH ALEXANDER LIDDLE

REVIEW BY E. MENCHER¹
Caracas, Venezuela

**The Geology of Venezuela and Trinidad*, by Ralph Alexander Liddle. 2d ed., revised and enlarged (1946). 890 pp. 6×9 inches. 180 halftones, 27 sections and maps, correlation chart, geologic map, and map showing mineral deposits, major structural features, and exploratory tests for oil. Green cloth. Paleontological Research Institution, Ithaca, New York. Price, \$10.

The publication, in 1928, of Liddle's *Geology of Venezuela and Trinidad* marked the greatest advance, up to then, in the knowledge of those regions. It not only was the first attempt to systematize and correlate the geology of Venezuela as a whole, but it brought forth many new data and numerous original ideas about the stratigraphy and geologic history of the country. As would be expected in a book of that kind, there were some errors, due partly to the insufficiency of paleontologic knowledge at the time and partly to the inadequacy of regional studies. Nevertheless, the clarity and completeness with which Liddle described the localities he knew, tended to make these errors of little importance, since the geologist familiar with more recent regional and stratigraphic interpretations could fit the older data into the newer ideas.

In the past twenty years, however, our geologic knowledge of Venezuela has increased tremendously. Before 1928, whatever information was known was kept in the confidential files of the oil companies whose geologists had secured that information. Aside from Liddle's book, the first real break in this secrecy came through the geological congresses, and their resulting publications, sponsored by the Venezuelan Government in 1938 and 1939, and attended by the most prominent geologists of that part of the world. We are also much indebted to the contributed of H. D. Hedberg, L. Kehler, H. Kugler, M. Kamen-Kaye, F. A. Sutton, V. M. Lopez, G. Zuloaga, R. A. Liddle, C. Gonzales de Juana, and the Aguerreveres in stratigraphy, and of H. H. Renz, D. W. Gravell, J. A. Cushman, H. D. Hedberg, C. M. Brame Caudri, W. L. F. Nuttall, A. A. Olsson, and the Hodsons in paleontology. But even more than from the published data, the geologist of to-day in Venezuela has a large background of knowledge built up from a freer general interchange of ideas with other geologists than was possible before 1930.

The new edition of Liddle's *Geology of Venezuela and Trinidad* is an attempt to bring the original book up to date by taking into account this mass of new information. Unfortunately, the new data are not really absorbed into the text but rather "tacked on" without any attempt at synthesis with the old concepts. Moreover, while the author was personally familiar with nearly all the localities mentioned in the first edition, it is obvious that his knowledge of the new ones is, at best, second-hand. Too much reliance has been placed on hasty conclusions or partly thought-out unpublished ideas of other geologists and these are quoted as facts. The new edition is therefore confusing and many of its references are vague. There are many places where the same locality is described under two distinct headings and entirely opposed interpretations given to it. A striking illustra-

¹ Socony-Vacuum Oil Company of Venezuela. Manuscript received, February 9, 1948.

tion of these criticisms is the discussion of the whole of north-central Venezuela. For example, on pages 202-205, Liddle repeats, almost word-for-word, his original description of the limestone "morros" in the area of San Juan de los Morros to San Francisco de Macaira, and reiterates his belief in an El Cantil (Early Cretaceous) age for them. Then, on pages 304-308, he redescribes the "morros" and correctly assigns them to the Early Eocene (Midway) as was shown by Miss Caudri. The reader unfamiliar with the details of Venezuelan geography would get the impression that there are both Eocene and Cretaceous "morros" in the area, and, indeed, Liddle seems to hold to such an idea. Yet, the identical localities are under discussion. On page 357, passing mention is made of "important mud flows in the Upper Eocene south of San Juan de los Morros." To date, no proved Upper Eocene has been found within 35 kilometers in any direction from San Juan de los Morros and, unless the basal members of the Guarumen group of Eocene, which is doubtful, and which, moreover, do not contain mud flows, there is no Upper Eocene at all south of San Juan de los Morros. Liddle seems to be referring either to the agglomerates or contact phases associated with the, probably, Early Eocene basic intrusions of the area or to the recemented broken edges of the Early Eocene "morros" reef limestones. Similar misstatements can be cited for almost every part of the country.

The best and most accurate parts of the book are those dealing with the area surrounding Lake Maracaibo, the region most familiar to the author. His preference for the western part of the country is clearly shown on his correlation chart, where, of 30 columns on Venezuela, 25 refer to the Andes, Lake Maracaibo, and Falcón and only 2 of the whole of the important eastern Venezuelan oil region. Even in the Maracaibo area, not all geologists will be satisfied with Liddle's correlations, as, for example, his insistence on an Oligocene age for the Mirador sandstone (interestingly enough, Liddle himself was probably the first to suggest its correlation with the Eocene Misoa sandstones) and his belief that the Mostrencos is part of the Misoa-Trujillo formation.

The book includes a chapter on economic geology, in which brief mention is made of coal, diamond, iron, copper, asbestos, sulphur, clay, bauxite, potassium, sodium, and iron salts, gold, mercury, magnesite, and asphalt deposits, while more space is devoted to a rapid summary of the principal oil fields and wildcat operations.

Taken as a whole, the new edition has value in bringing together a great mass of factual data on a poorly known part of the world. Its detailed information must be critically examined, however, before being accepted.

RECENT PUBLICATIONS

CHINA

*"Oil Prospects of China as Related to the Carbon Ratio," by Weng Wen-Po. *Oil and Gas Jour.*, Vol. 46, No. 38 (Tulsa, January 22, 1948), pp. 45-46, 131; 2 maps.

EUROPE

*"Oil-Hungry Europeans Seek Added Production." *The Lamp*, Vol. 30, No. 1 (New York, January, 1948), pp. 29-31; full-page map of Western Europe, showing present producing fields and sedimentary basins in which new production may be found.

GENERAL

*"Geological Correlation and Paleogeology," by R. S. Allan. *Bull. Geol. Soc. America*, Vol. 59, No. 1 (New York, January, 1948), pp. 1-10.

*"Critique of the Time-Stratigraphic Concept," by H. E. Wheeler and E. Maurice Beesley. *Ibid.*, pp. 75-86; 3 figs.

*"Relative Permeability Studies," by J. H. Henderson and S. T. Yuster. *Producers Monthly*, Vol. 12, No. 3 (Bradford, Pennsylvania, January, 1948), pp. 13-20; 7 figs.

Who's Who in Engineering, 6th ed. (1948). 2357 pp. 6×9 inches. Cloth. Obtainable from Lewis Historical Publishing Company, Inc., 8th Avenue at 14th Street, New York 11, N. Y. Price, \$15.

The Permo-Triassic Formations—A World Review, by R. L. Sherlock. 367 pp. Frontispiece and 15 figs. 6×9 inches. "In the author's opinion the acceptance of the Permian system was an error in Murchison's part, and efforts made to provide a new denotation for the old name have led to much controversy, and no agreement has been reached. He produces arguments to show that the validity of the Permian system can not be admitted, and points out that in many countries the Permian can be readily divided into two divisions, one of which is closely connected with the Carboniferous and the other with the Trias. The author contends that the recognition of this fact solves the question of the validity of the Permian as a separate system, and recommends that the name be dropped altogether." Hutchinson's Scientific and Technical Publications, 47 Princes Gate, London, S.W. 7, England. Price, 31s. 6d., net.

GREAT BRITAIN

*"Chert Formation in the Bargate Beds of the Churt Neighbourhood, Survey [England]," by J. A. Richardson. *Proc. Geol. Assoc.*, Vol. 58, Pt. 3 (December 31, 1947), pp. 161-77, Figs. 10-11. Weald Research Committee Report, No. 35. Published by Banham and Company, Limited, High Street, Colchester, England. Price of complete December issue, 5/-.

*"The Work of the Late Mr. Frank Gossling on the Stratigraphy of the Lower Greensand between Brockham (Survey) and Westerham (Kent)," by J. F. Kirkaldy. *Ibid.*, pp. 178-91, Figs. 12-13, Pl. 6.

*"Studies of Pebbles from the Lower Cretaceous Rocks," by A. K. Wells, F. Gossling, J. F. Kirkaldy, and K. P. Oakley. *Ibid.*, pp. 194-258, Figs. 14-26, Pls. 7-12.

*"Mechanical Analysis of the Lower Greensand of Northwest Survey," by H. S. Rogers and J. A. Richardson. *Ibid.*, pp. 259-69, Figs. 27-29.

*"The Structure of the Coal Measures in the Pontardawe-Ammanford Area, South Wales," by Frederick Murray Trotter. *Quar. Jour. Geol. Soc. London*, Vol. 103, No. 410, Pt. 2 (October 15, 1947), pp. 89-133, Figs. 1-18, Pl. 6. Published by Longmans, Green and Company, Ltd., 6-7 Clifford Street, London, W. I. Price, 10s.

ILLINOIS

*"Physiographic Divisions of Illinois," by M. M. Leighton, George E. Ekblaw, and Leland Horberg, *Jour. Geol.*, Vol. 56, No. 1 (Chicago, January, 1948), pp. 17-33; 4 figs., 1 table.

KANSAS

*"Cemented Sandstones of the Dakota and Kiowa Formations in Kansas," by Ada Swineford. *Kansas Geol. Survey Bull.* 70, Pt. 4 (Lawrence, November 15, 1947), pp. 53-104, Figs. 1-3, Pls. 1-7.

*"Magnetic Survey of Southeastern Crawford County, Kansas," by Robert M. Freyer. *Ibid.*, Pt. 5 (December 15, 1947), pp. 105-15, Pls. 1-3.

LOUISIANA

*"Oil and Gas Map of Louisiana. Compiled by Louisiana Geological Survey, Leo W.

Hough, State geologist (Baton Rouge, October, 1947). Sheet, 44×40 inches. Scale: 1.125 inches equals 10 miles. In colors. Shows oil and gas fields, salt domes, pipe lines, refineries, *et cetera*.

MEXICO

*"Carta geologica de la parte septentrional de la Republica Mexicana" (Geological Map of Northern Mexico), by Philip B. King. *Instituto de Geologia, Geofisica y Geodesia, Cartas Geol. y Min. Republica Mexicana No. 3* (Mexico, D. F., October, 1947). 24 pp., 2 pls., 5 figs.

NEW MEXICO

"Geologic Map of Part of Eastern San Juan Basin, Rio Arriba County, New Mexico," by C. H. Dane. *U. S. Geol. Survey Prelim. Map 78*, Oil and Gas Inves. Ser. (February, 1948). Sheet, 44×45 inches. May be purchased from Director, Geological Survey, Washington 25, D. C. Price, \$1.00.

*"Caprock Pool Statistical Report, Chaves and Lea Counties, New Mexico," by N. Raymond Lamb and William B. Macey. *New Mexico Bur. Mines and Min. Resources Cir. 17* (Socorro, 1947). 2 pp. text, 10 pp. tables, 1 chart, 3 maps. 8.5×11 inches, stapled.

PENNSYLVANIA

*"Geologic Aspects of Petroleum Exploration in Pennsylvania," by Frank M. Swartz. *Producers Monthly*, Vol. 12, No. 3 (Bradford, Pennsylvania, January, 1948), pp. 21-27; 3 figs.

*"Petrologic Aspects of Prospecting for Deep Oil Horizons in Pennsylvania," by Paul D. Krynine. *Ibid.*, pp. 28-33; 1 fig.

UTAH

"Geologic Map of Eastern and Southern Utah," by D. A. Andrews and C. B. Hunt. *U. S. Geol. Survey Prelim. Map 70*, Oil and Gas Inves. Ser. (January, 1948). Sheet, 40×51 inches. Scale, 1:500,000. For sale by Director, Geological Survey, Washington 25, D. C. Price, \$0.50.

WYOMING

*"Early Tertiary Fonglomerate, Big Horn Mountains, Wyoming," by Robert P. Sharp. *Jour. Geol.*, Vol. 56, No. 1 (Chicago, January, 1948), pp. 1-15; 6 figs., 4 pls.

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GROVER E. MURRAY

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GAYLE SCOTT
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H. D. THOMAS
ROBERT O. VERNON
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F. H. LAHEE (1950), *chairman*, Sun Oil Company, Box 2880, Dallas, TexasPAUL WEAVER (1948), *vice-chairman*, Gulf Oil Corporation, Box 2100, Houston, Texas

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1950
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R. J. CULLEN
W. S. MCCABE
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DISTINGUISHED LECTURE COMMITTEE

FRED H. MOORE (1949), *chairman*, Magnolia Petroleum Company, Roswell, New Mexico

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<i>Elected In</i>	<i>At</i>	<i>President</i>	<i>Vice- President¹</i>	<i>Secretary- Treasurer²</i>	<i>Editor³</i>
1917	Tulsa	J. Elmer Thomas	Alex. Deussen	M. G. Mehl	C. H. Taylor
1918	Oklahoma City	Alex. Deussen	I. C. White ⁴	W. E. Wrather	C. H. Taylor
1919	Dallas	I. C. White ⁴	Irving Perrine	C. E. Decker	C. H. Taylor
1920	Dallas	W. E. Pratt	Alex. W. McCoy ^{5a}	C. E. Decker	R. C. Moore
1921	Tulsa	G. C. Matson ⁵	G. C. Gester	C. E. Decker	R. C. Moore
1922	Oklahoma City	W. E. Wrather	Max W. Ball	C. E. Decker	R. C. Moore
1923	Shreveport	Max W. Ball	F. W. DeWolf	C. E. Decker	R. C. Moore
1924	Houston	J. H. Gardner	E. G. Gaylord	C. E. Decker	R. C. Moore
1925	Wichita	E. L. DeGolyer	R. S. McFarland	C. E. Decker	R. C. Moore
1926	Dallas	Alex. W. McCoy ^{5a}	C. R. McCollom	Fritz L. Aurin	J. L. Rich
1927	Tulsa	G. C. Gester	Luther H. White	David Donoghue	J. L. Rich
1928	San Francisco	R. S. McFarland	J. E. Elliott	David Donoghue	J. L. Rich
1929	Fort Worth	J. Y. Snyder ⁶	Fred H. Kay ⁷	A. R. Denison	F. H. Lahee
1930	New Orleans	Sidney Powers ⁸	Ralph D. Reed ⁹	Marvin Lee	F. H. Lahee
1931	San Antonio	L. P. Garrett ¹⁰	L. C. Decius	Frank R. Clark	F. H. Lahee
1932	Oklahoma City	F. H. Lahee	R. J. Riggs	W. B. Heroy	R. D. Reed ⁹
1933	Houston	Frank R. Clark	George Sawtelle	W. B. Heroy	L. C. Snider ¹³
1934	Dallas	W. B. Heroy	E. B. Hopkins ¹¹	M. G. Cheney	L. C. Snider
1935	Wichita	A. I. Levorsen	F. A. Morgan	E. C. Moncrief	L. C. Snider
1936	Tulsa	Ralph D. Reed ⁹	C. E. Dobbin	Chas. H. Row	L. C. Snider
1937	Los Angeles	H. B. Fuqua	C. L. Moody	Ira H. Cram	W. A. Ver Wiebe
1938	New Orleans	D. C. Barton ¹²	H. W. Hoots	Ira H. Cram	W. A. Ver Wiebe
1939	Oklahoma City	Henry A. Ley	L. M. Neumann	Ed. W. Owen	W. A. Ver Wiebe
1940	Chicago	L. C. Snider ¹³	John M. Vetter	Ed. W. Owen	W. A. Ver Wiebe
1941	Houston	Ed. W. Owen	Earl B. Noble	E. O. Markham	W. A. Ver Wiebe
1942	Denver	F. L. Aurin	Paul Weaver	E. O. Markham	W. A. Ver Wiebe
1943	Fort Worth	A. R. Denison	R. W. Clark	R. E. Rettger	Carey Croneis
1944	Dallas	Ira H. Cram	W. B. Weeks	R. E. Rettger	Gayle Scott
1945	Tulsa	M. G. Cheney	M. Gordon Guley	Ed. A. Koester	Gayle Scott
1946	Chicago	Earl B. Noble	D. Perry Olcott	Ed. A. Koester	Gayle Scott
1947	Los Angeles	C. E. Dobbin	Geo. S. Buchanan	J. V. Howell	C. L. Moody
1948	Denver	Paul Weaver	Roy M. Barnes	J. V. Howell	C. L. Moody

¹ From March 1920, to March, 1932, the corresponding office was *first vice-president*.² From March 1920, to March, 1932, the corresponding office was *second vice-president in charge of finances*.³ From March, 1920, to March, 1932, the corresponding office was *third vice-president in charge of editorial work*.⁴ Died, November 25, 1927.⁵ Died, January 3, 1940.⁶ Died, January 10, 1930.⁷ Died, June 30, 1944.⁸ Died, July 9, 1943.⁹ Died, November 5, 1932.¹⁰ Died, January 20, 1940.¹¹ Died, December 13, 1943.¹² Died, July 5, 1940.¹³ Died, July 8, 1939.¹⁴ Died May 24, 1947.

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
MEMBERSHIP LIST¹

FEBRUARY 28, 1948

HONORARY MEMBERS

The executive committee may from time to time elect as honorary members persons who have contributed distinguished service to the cause of petroleum geology. Honorary members shall not be required to pay dues.—*Sec. 6, Article III, of the Constitution.*

LIFE MEMBERS

The executive committee may grant life membership to members who have paid their dues and are otherwise qualified.—*Sec. 2, Article III, of the Constitution.*

On the payment of two hundred dollars (\$200.00) any member in good standing shall be declared a life member and thereafter shall not be required to pay annual dues.—*Sec. 2, Article I, of the By-Laws.*

MEMBERS

Any person engaged in the work of petroleum geology or in research pertaining to petroleum geology or technology is eligible to active membership, provided he is a graduate of an institution of collegiate standing, in which institution he has done his major work in geology, or in sciences fundamental to petroleum geology, and in addition has had the equivalent of three years' experience in petroleum geology or in the application of these other sciences to petroleum geology or to research in petroleum geology or technology; and provided further that in the case of an applicant for membership who has not had the required collegiate or university training, but whose standing in the profession is well recognized, he shall be admitted to membership when his application shall have been favorably and unanimously acted upon by the executive committee, and provided further that these requirements shall not be construed to exclude teachers and research workers in recognized institutions whose work is of such character as in the opinion of the executive committee shall qualify them for membership.

Active members alone shall be known as members.—*Sec. 1, Article III, of the Constitution.*

ASSOCIATES

Any person having completed as much as thirty hours of geology (an hour shall here be interpreted as meaning as much as sixteen recitation or lecture periods of one hour each, or the equivalent in laboratory) in a reputable institution of collegiate or university standing, or who has done field work equivalent to this, is eligible to associate membership, provided at the time of his application for membership he shall be engaged in geological studies in an institution of collegiate or university standing; or shall be engaged in petroleum geology; and any person who is a graduate of an institution of collegiate standing, in which he has done his major work in sciences fundamental to petroleum geology or petroleum technology, and who has had the equivalent of one year's experience in the application of his science to the study of petroleum geology, shall be eligible to associate membership, provided at the time of his application for membership he shall be engaged in investigations in the broader subject of petroleum geology and technology.

Associate members shall be known as associates.

Associates shall enjoy all the privileges of membership in the Association, save that they shall not hold office, sign applications for membership, or vote; neither shall they have the privilege of advertising their affiliation with the Association in professional cards or professional reports or otherwise.—*Sec. 3, Article III, of the Constitution.*

¹ This list is published for the use of the members and for the information of all who wish to refer to the professional and business affiliations of the members. It is not a mailing address list and it is not intended to be used for circularizing or soliciting purposes.

MEMBERS

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HONORARY MEMBERS

	<i>Date of Election</i>
Decker, Charles Elijah, Univ. of Oklahoma, Norman, Okla.	Mar. 26, 1927
DeGolyer, Everette Lee, 1000 Continental Bldg., Dallas, Tex.	Dec. 8, 1944
Emmons, William H., Univ. of Minnesota, Minneapolis, Minn.	Feb. 28, 1946
Gould, Charles Newton, Box 680, Norman, Okla.	Oct. 13, 1943
Harris, Gilbert Dennison, 126 Kelvin Pl., Ithaca, N. Y.	Mar. 19, 1935
Lahee, Frederic H., Sun Oil Co., Dallas, Tex.	Feb. 15, 1947
Lawson, Andrew Cowper, Bacon Hall, Univ. of California, Berkeley, Calif.	Dec. 22, 1937
Mendenhall, Walter Curran, 9 E. Lenox St., Chevy Chase, Md.	Mar. 19, 1935
Miser, Hugh D., U. S. Geol. Survey, Washington, D. C.	Jan. 13, 1948
Ordonez, Ezequiel, Abraham Gonzalez 79, Mexico City, Mex.	Dec. 28, 1935
Sellards, E. H., Bureau of Economic Geol., Box B, Univ. Sta., Austin, Tex.	Feb. 28, 1946
Stille, Hans, Geol. Inst., Univ. of Berlin, Berlin, Germany	Mar. 15, 1937
Twenhofel, W. H., Univ. of Wisconsin, Madison, Wis.	Oct. 25, 1946
Woolnough, Walter George, c/o W. L. Woolnough, "Calabonna," Park Ave., Gordon, N. S. W., Australia	Mar. 21, 1941
Wrather, William Embry, U. S. Geol. Survey, Washington, D. C.	Oct. 13, 1943

COMPLETE LIST OF MEMBERS, ASSOCIATES, HONORARY MEMBERS, AND LIFE MEMBERS

Honorary	15
Life	15
Members	4,181
Associates	1,308
Total	5,519

EXPLANATION OF SYMBOLS

*Honorary Members. †Life Member. ‡Associate. Members are not marked. The year refers to the date of election to membership.

Abbey, Gerald Ellsworth, c/o Charles O. Abbey, R. F. D. 1, Platte City, Mo.	42
Abbott, Earl O., Hudson's Bay Oil & Gas Co., Ltd., 510 Ninth Ave., W., Calgary, Alta., Canada	46
Abbott, John L., Pritchard & Abbott, Century Bldg., Fort Worth, Tex.	27
Abbott, Robert Henry, Jr., Prod. Dept., The Texas Co., Box 951, Houma, La.	47
Abbott, Wayne Rosser, Wood River Oil & Refg. Co., Oklahoma City, Okla.	42
Abel, Walter D., Calif. Div. of Corporations, 217 W. First St., Los Angeles, Calif.	47
Abell, George T., independent, Box 430, Midland, Tex.	29
Abernathy, George Elmer, Kansas Geol. Survey, Pittsburg, Kan.	38
Abreu, Sylvio Froes, Mineral Industries Div., Av. Venezuela 82, Rio de Janeiro, Brazil, S. A.	45
Absher, Kenneth B., independent, Milam Bldg., San Antonio, Tex.	25
Absher, William F., Cities Service Oil Co., Bartlesville, Okla.	20
Acheson, Cyrus Harold, International Ecuadorian Petr. Co., Guayaquil, Ecuador, S. A.	39
Achning, Walter J., independent, Milam Bldg., San Antonio, Tex.	38
Ackerman, Edgar Dumont, Standard Oil Co. of Venezuela, Caripito, Venezuela, S. A.	40
Ackers, A. L., Stanolind Oil & Gas Co., Box 591, Tulsa, Okla.	25
Ackley, Kenneth A., Carter Oil Co., Box 568, Mattoon, Ill.	38
Acosta-Sarmiento, Gonzalo, Edificio Colombia, Of. 602-603, Carrera 9, No. 14-36, Bogota, Colombia, S. A.	42
Adair, J. Smith, U. S. Forest Service, Ogden, Utah	45
Adams, Bradford Clarendon, consulting, Rm. 533, Roosevelt Bldg., 727 W. Seventh St., Los Angeles, Calif.	41
Adams, Clyde B., Socony-Vacuum Oil Co., Inc., Rm. 1700, 26 Broadway, New York, N. Y.	41
Adams, Elmo W., Honolulu Oil Corp., 215 Market St., San Francisco, Calif.	30
Adams, Frank C., consulting, Rt. 8, Tyler, Tex.	27
Adams, John Emery, Standard Oil Co. of Tex., Box 1249, Houston, Tex.	20
Adams, Kilburn Elie, Jr., The Texas Co., Box 1801, Wichita, Kan.	38

Adams, Robert James, Phillips Petr. Co., 3102 Milby, Wichita Falls, Tex.	42
Adams, Robert Wiley, Box 664, Resdea, Calif.	42
Adams, W. C., independent, 1224 Hazel Blvd., Tulsa, Okla.	24
Addington, Harold Wallace, The Calif. Co., Ranglely, Colo.	43
Addington, James William, Humble Oil & Refg. Co., 202 Humble Bldg., Houston, Tex.	44
Addison, Carl C., Pure Oil Co., 747 Canal Bldg., New Orleans, La.	30
Aderman, Charles Vidor, Keystone Explor. Co., 2813 Westheimer Rd., Houston, Tex.	45
Adkins, W. S., Shell Oil Co., Inc., Box 2009, Houston, Tex.	20
Adkisson, Albert W., independent, 2010 W. T. Waggoner Bldg., Fort Worth, Tex.	34
Adler, Frank J., Stanolind Oil & Gas Co., 619 N. Eleventh St., Garden City, Kan.	45
Adler, Joseph L., Independent Prospecting Co., 901 Esperson Bldg., Houston, Tex.	30
Agee, Flint Humphrey, United Geophysical Co., Huntington Park, Calif.	38
Agey, Charles Samuel, Amerada Petr. Corp., Box 2249, Casper, Wyo.	38
Agney, Allen Francis, Stanford Univ., Stanford University, Calif.	44
Agnich, Fred J., Geophysical Service, Inc., 6000 Lemmon Ave., Dallas, Tex.	41
Aguerrevere, Pedro L., Estados Unidos de Venezuela, Apt. 1253, Caracas, Venezuela, S. A.	24
Aguerrevere, Santiago E., Estados Unidos de Venezuela, Apt. 1253, Caracas, Venezuela, S. A.	24
Aimer, James D., Barnsdall Oil Co., 427 Ricou-Brewster Bldg., Shreveport, La.	26
Ainsworth, David, Western Petr. Explor. Co., Wichita, Kan.	23
Aitken, William Ernest, Richmond Petr. Co. of Colombia, Apt. Postal 2760, Bogota, Colombia, S. A.	32
Akers, Wilburn Holt, Columbia Univ., New York, N. Y.	41
Akerman, Richard Pete, Gulf Oil Corp., Box 2100, Houston, Tex.	41
Alagood, Robert Henson, Sunray Oil Corp., 526 Ricou-Brewster Bldg., Shreveport, La.	39
Alba y Soto, Alonso de, Petroleos Mexicanos, Apt. 150, Tampico, Tamps., Mex.	45
Albear, Jesus Francisco de, Ministerio de Agricultura, Edificio Castro, Calle 25, No. 160 bajos, Vedado, Havana, Cuba.	47
Alberding, Herbert, Phillips Venezuelan Oil Co., Apt. de Correos No. 1031, Caracas, Venezuela, S. A.	46
Albert, Emil Richard, Jr., Mud Products, Inc., 508 Philtower Bldg., Tulsa, Okla.	42
Albertson, Maurice M., Box 1154, Houston, Tex.	20
Albright, Charles C., Jr., Long Beach Oil Devel. Co., 255 S. Santa Clara, Long Beach, Calif.	45
Albright, Emory Glenn, The Atlantic Refg. Co., Dallas, Tex.	47
Albritton, Claude Carroll, Jr., U. S. Geol. Survey, Dallas, Tex.	39
Alcock, Charles William, The Atlantic Refg. Co., Dallas, Tex.	47
Alcorn, Avary Hunt, The Atlantic Refg. Co., 1742 Milam Bldg., San Antonio, Tex.	32
Alcorn, James Munreux, Pacific Islands Engineers, Guam, M. I.	42
Alderman, Willis Howard, Stanolind Oil & Gas Co., Sweetwater, Tex.	47
Aldrich, Henry R., Geol. Society of America, 419 W. One Hundred Seventeenth St., New York, N. Y.	45
Alexander, C. I., Magnolia Petr. Co., Box 780, Tyler, Tex.	27
Alexander, Clyde Wayne, Dixie Geol. Service, 202 Tower Bldg., Jackson, Miss.	38
Alexander, Joseph Watrous, Cities Service Oil Co., Masonic Bldg., Bartlesville, Okla.	43
Alexander, Walter Herbert, Jr., Texas A. & M. College, College Station, Tex.	42
Alkire, Robert Leo, West Virginia Univ., Morgantown, W. Va.	47
Allan, John Andrew, Univ. of Alberta, Edmonton, Alta., Canada.	30
Allan, Thomas H., consulting, 921 Union Natl. Bank Bldg., Wichita, Kan.	24
Allardyce, Robert Edward Lee, Jr., Stanolind Oil & Gas Co., Box 40, Casper, Wyo.	42
Allen, Alton C., Rowan & Nichols Oil Co., 903 Commercial Standard Bldg., Fort Worth, Tex.	35
Allen, Arthur Thomas, Jr., Emory Univ., Emory University, Ga.	47
Allen, Bryant W., Woodley Petr. Co., 211 Deposit Guaranty Bank Bldg., Jackson, Miss.	25
Allen, Charles Francis, Gen. Del., Tahoe Valley, Calif.	42
Allen, Charles Gardner, Standard Oil Co. of Calif., Camp 11-C, Taft, Calif.	47
Allen, Charles Maurice, Phillips Petr. Co., 521 Esperson Bldg., Houston, Tex.	46
Allen, Devere F., 1453 Safford Ave., Fresno, Calif.	29
Allen, Donald M., Westgate-Greenland Oil Co., 1022 Union Natl. Bank Bldg., Wichita, Kan.	24
Allen, E. G., independent, 6745 Avalon Ave., Dallas, Tex.	17
Allen, Frank Tilbury, Gulf Research & Devel. Co., Box 2038, Pittsburgh, Pa.	39
Allen, Fraser Hall, Stanolind Oil & Gas Co., Box 591, Tulsa, Okla.	43
Allen, Harris Hayes, Phillips Petr. Co., 521 Esperson Bldg., Houston, Tex.	39
Allen, John Eliot, Dept. of Earth Sciences, Pennsylvania State College, State College, Pa.	46
Allen, Lynn D., Socony-Vacuum Oil Co. of Venezuela, Apt. 246, Caracas, Venezuela, S. A.	47
Allen, Stanley R., Humble Oil & Refg. Co., 808 Humble Bldg., Houston, Tex.	35
Allen, William Hammond, Shell Oil Co., Inc., Box 1509, Midland, Tex.	40

Allen, William Odis, Jr., Bay Petr. Corp., 1006 Brown Bldg., Wichita, Kan.	39
Allin, Philip Robert, Gulf Refg. Co., Box 37, Harvey, La.	47
Allison, A. P., Sun Oil Co., Box 1215, Shreveport, La.	21
Allon, Meyer Michael, Gulf Research & Devel. Co., Box 2038, Pittsburgh, Pa.	37
Almeida, Luis Alves de, Conselho Nacional do Petroleo, Bahia, Brazil, S. A.	47
Almgren, Alvin Arnold, The Superior Oil Co., Bakersfield, Calif.	47
Alpha, Andrew G., General Petr. Corp., Great Falls, Mont.	43
Alquist, Francis Nelson, Dow Chemical Co., Midland, Mich.	38
Altinli, Ibrahim Enver, Div. of Geol. Sciences, Calif. Inst. of Tech., Pasadena, Calif.	48
Alvarado, Benjamin, Ministerio de Minas y Petroleo, Bogota, Colombia, S. A.	38
Alvarez, Manuel, Jr., Petroleos Mexicanos, Nogal 52, Mexico, D. F., Mex.	36
Ambrose, A. W., Cities Service Oil Co., Box 395, Bartlesville, Okla.	19
Ames, Edward W., consulting, Box 2091, San Antonio, Tex.	19
Ammon, Walter Lamm, Stanolind Oil & Gas Co., Wichita Falls, Tex.	46
Amsden, Edgar A., Stanolind Oil & Gas Co., Box 1092, Shreveport, La.	47
Amstutz, Platte T., Jr., Amstutz & Yates, Inc., 406 K. F. H. Bldg., Wichita, Kan.	44
Amuedo, Curtis Leyrer, Louisiana Geol. Survey, Geol. Bldg., Louisiana State Univ., Baton Rouge, La.	48
Amxy, James William, U. S. Bureau of Mines, Wichita Falls, Tex.	46
Andersen, Harold V., Univ. of Louisiana, Baton Rouge, La.	40
Anderson, Benjamin Louis, Skelly Oil Co., Box 1822, Pampa, Tex.	45
Anderson, Carl B., Gulf Refg. Co., Box 482, Mattoon, Ill.	19
Anderson, Carl C., U. S. Bureau of Mines, Washington, D. C.	32
Anderson, Carl T., Republic Natural Gas Co., 1155 First Natl. Bldg., Oklahoma City, Okla.	41
Anderson, Carlos O., Texas Pacific Coal & Oil Co., Gainesville, Tex.	46
Anderson, George Harold, 215 Cotton Exchange Bldg., Dallas, Tex.	40
Anderson, Howard T., Standard Oil Co. of Calif., Rosemead, Calif.	44
Anderson, Jack Q., Barnsdall Oil Co., 568 Habersfelde Bldg., Bakersfield, Calif.	40
Anderson, James Burt, Continental Oil Co., 601 W. Fifth St., Los Angeles, Calif.	38
Anderson, John G., Jr., consulting, 901 Southern Standard Bldg., Houston, Tex.	21
Anderson, Keith Elliott, Missouri Geol. Survey, Rolla, Mo.	44
Anderson, Kenneth Clyde, Skelly Oil Co., Box 993, Midland, Tex.	42
Anderson, Oscar Samuel, Jr., Big Four Petr. Co., Box A., Oilton, Okla.	39
Anderson, Payton Victor, Humble Oil & Refg. Co., 1405 Canal Bldg., New Orleans, La.	46
Anderson, Richard Jasper, Battelle Memorial Inst., Columbus, Ohio.	42
Anderson, Richard S., Anderson, Huffman & Johnson, Box 1884, Midland, Tex.	31
Anderson, Robert Edwin, Signal Oil & Gas Co., Los Angeles, Calif.	44
Anderson, Robert G., independent, Box 2153, Abilene, Tex.	38
Anderson, Robert Lee, Geophoto Services, Inc., 305 E. & C. Bldg., Denver, Colo.	47
Anderson, Robert van Vleck, Stanford Univ., Stanford University, Calif.	23
Anderson, Rudolph Faraday, consulting, 415 Lumpkin Bldg., Mattoon, Ill.	42
Anderson, Thomas Corwin Iliff, Chanslor-Canfield Midway Oil Co., 4549 Produce Plaza W., Los Angeles, Calif.	40
Anderson, Tom A., Carter Oil Co., Box 801, Tulsa, Okla.	36
Anderson, Warren D., Anderson, Huffman & Johnson, Box 1884, Midland, Tex.	27
Andrau, Evert Willem Karel, consulting, Box 2408, Houston, Tex.	32
Andrews, David Arthur, U. S. Geol. Survey, N. Interior Bldg., Washington, D. C.	44
Andrews, Harry Hugh, Seismograph Service Corp., 709 Kennedy Bldg., Tulsa, Okla.	30
Andrews, Philip, independent, Box 266, Boulder, Colo.	25
Andrews, Sterling, Gulf Oil Corp., Box 2100, Houston, Tex.	48
Andrews, Thomas Gayle, Univ. of Alabama, University, Ala.	37
Andrews, Wilton W., Humble Oil & Refg. Co., 863 Humble Bldg., Houston, Tex.	36
Anisgard, Harry William, Creole Petr. Corp., Apt. 889, Caracas, Venezuela, S. A.	41
Apfel, Earl T., Syracuse Univ., Syracuse, N. Y.	29
Applegate, Margaret Jayne, Sun Oil Co., Home Bank Bldg., Toledo, Ohio.	47
Applin, Paul L., U. S. Geol. Survey, Tallahassee, Fla.	19
Archie, Gustave Erdman, Shell Oil Co., Inc., Box 2090, Houston, Tex.	38
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Blank, Horace Richard, Southwestern Univ., Georgetown, Tex.	38
Blanpied, B. W., Gulf Refg. Co., Box 1731, Shreveport, La.	23
Blau, Ludwig Wilhelm, Humble Oil & Refg. Co., Box 2180, Houston, Tex.	30
Blakley, Alfred Bishop, Stanolind Oil & Gas Co., Box 689, Jackson, Miss.	39
Bleeker, Edward S., Gulf Oil Corp., 1615 Whitehall Bldg., 17 Battery Pl., New York, N. Y.	21
Bleyberg, Arnold, The Texas Co., Box 2332, Houston, Tex.	40
Blixt, John Elmer, The Texas Co., Box 405, Shelby, Mont.	40
Blodget, Ward B., consulting, 417 S. Hill St., Los Angeles, Calif.	24
Bloesch, Edward, consulting, 409 Philtower Bldg., Tulsa, Okla.	17
Bloomer, Philip Arthur, Jr., Skelly Oil Co., Ardis Bldg., Shreveport, La.	45
Blouin, Cecil Francis, Standard Oil Co., of Kan., Houston, Tex.	39

Boardman, Robert Leland, 7 Washington Sq., N., New York, N. Y.	47
Bocock, Oscar Lafayette, The Texas Co., 902 Jones Bldg., Corpus Christi, Tex.	38
Bode, Francis Dashwood, The Texas Co., 929 S. Broadway, Los Angeles, Calif.	38
Bodkin, Hillard Winton, The Superior Oil Co., 719 Citizens Natl. Bank Bldg., Evansville, Ind.	39
Boehms, Eugene Field, Woodley Petr. Co., Box 1872, Abilene, Tex.	31
Bohart, Philip H., Gulf Oil Corp., Box 661, Tulsa, Okla.	23
Boling, Kenneth George, c/o Sam D. Jarvis, 1005 Hulman Bldg., Evansville, Ind.	38
Bolinger, John Wiley, Humble Oil & Refg. Co., 808 Humble Bldg., Houston, Tex.	39
Bolyard, Garrett L., Barnsdall Oil Co., 404 Kerr-McGee Bldg., Oklahoma City, Okla.	27
Bonar, Robert Emerson, Forest Oil Corp., 1229 Milam Bldg., San Antonio, Tex.	40
Bond, Henry Lofland, Phillips Venezuelan Oil Co., Apt. 1031, Caracas, Venezuela, S. A.	43
Bong, Carl P., consulting, 435 Wilson Bldg., Corpus Christi, Tex.	27
Bonifield, Henry Lease, Senora Oil & Gas Co., Box 108, Ada, Okla.	44
Boone, Dan Eugene, Halliburton Oil Well Cementing Co., Houston, Tex.	35
Boos, C. Maynard, Barnsdall Oil Co., Denver, Colo.	26
Boos, Edward J., Sohio Petr. Co., Box 359, Casper, Wyo.	27
Booth, Robert T., Standard Oil Co. of Tex., Box 1240, Houston, Tex.	34
Booth, William Norfolk, consulting, Rt. 7, Box 255, Bakersfield, Calif.	38
Borax, Eugene, Union Oil Co. of Calif., Union Oil Bldg., Los Angeles, Calif.	41
Borden, Joseph L., Pure Oil Co., Durango, Colo.	27
Borden, S. P., consulting, 517 City Bank Bldg., Shreveport, La.	24
Borders, Allan, The Ohio Oil Co., Winchester, Ky.	45
Boreing, Myriel James, Dunn & Boreing, 208 Newman Bldg., Durango, Colo.	40
Borger, Harvey D., Creole Petr. Corp., Maturin, Jusepin, Venezuela, S. A.	38
Boring, Burl J., Continental Oil Co., Box 879, Clinton, Okla.	48
Borland, Allen Milton, Gravity Meter Dept., Sun Oil Co., Beaumont, Tex.	47
Born, Howard Raymond, Harrison Oil Co., 2105 Gulf Bldg., Houston, Tex.	39
Born, Milton Charles, Amerada Petr. Corp., 552 Subway Terminal Bldg., Los Angeles, Calif.	46
Born, William Theodore, Geophysical Research Corp., 2607 N. Boston Pl., Tulsa, Okla.	32
Bornhauser, Max, Continental Oil Co., Box 569, Lafayette, La.	28
Bosco, Francis Neal, consulting, 853 Elm St., Denver, Colo.	42
Boss, Reuel Lee, Gulf Oil Corp., Box 1667, Hobbs, N. Mex.	42
Bossard, Leon, 31 Edmund St., St. Heliers, Auckland, N. Z.	29
Bostick, Francis Xavier, c/o Glenn H. McCarthy, 15th Fl., Sterling Bldg., Houston, Tex.	42
Bostick, J. Wallace, consulting, 3116 Main St., Dallas, Tex.	19
Botero-Arango, Gerardo, Universidad Nacional Colombia, Balboa 63-13, Medellin, Colombia, S. A.	43
Bounds, Bland David, Phillips Petr. Co., 903 Old Natl. Bank Bldg., Evansville, Ind.	47
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Bowen, Charles F., 1231 East, 4 South, Salt Lake City, Utah	20
Bowen, Gilbert Todd, Standard Oil Co. of Tex., Sherman, Tex.	38
Bowen, James P., consulting, 512 City Natl. Bldg., Wichita Falls, Tex.	18
Bower, John O., Texas Petr. Co., Apt. Postal 877, Bogota, Colombia, S. A.	29
Bower, Thomas Henry, Trinidad Leaseholds, Ltd., Pointe-a-Pierre, Trinidad, B. W. I.	42
Bowes, Glenn H., Continental Oil Co., 601 W. Fifth, Los Angeles, Calif.	24
Bowler, James William, Colombian Petr. Co., Apt. 100, Cucuta, Colombia, S. A.	39
Bowles, Edgar Oliver, Rutgers Univ., New Brunswick, N. J.	40
Bowles, R. C., Standard Oil Co. of Kan., Box 256, Houston, Tex.	27
Bowles, Thomas K., The Ohio Oil Co., Oil & Gas Bldg., Houston, Tex.	37
Bowling, Leslie, c/o William Helis, 912 Whitney Bldg., New Orleans, La.	30
Bowman, Wayne F., consulting, 2342 Rice Blvd., Houston, Tex.	19
Bowser, William F., R. W. Rine Drlg. Co., Central Bldg., Wichita, Kan.	27
Bowsher, Arthur Leroy, Kansas Geol. Survey, Lawrence, Kan.	42
Boyd, Harold E., Panhandle Pipe Line Co., E. Lansing, Mich.	17
Boyd, Lewis Henry, Western Geophysical Co., 1341 S. Boston Ave., Tulsa, Okla.	41
Boyd, W. Baxter, Continental Oil Co., Ponca City, Okla.	29
Boyer, Carle Sheldon, The Texas Co., Box 299, Salem, Ill.	48
Boyer, Will W., consulting, 1737 Milam Bldg., San Antonio, Tex.	28
Boylan, Ebert E., Caracas Petr., S. A., Apt. 80, Caracas, Venezuela, S. A.	19
Boyle, James Philip, Jr., consulting, 607 N. E. Fifteenth St., Oklahoma City, Okla.	43
Boyle, Walter J., consulting, 1038 Milam Bldg., San Antonio, Tex.	26
Braccacini, Osvaldo I., Dto. Exploraciones, Y. P. F., Avda. R. S. Pena 777, Buenos Aires, Argentina, S. A.	40
Brace, Orval L., consulting, 1517 Second Natl. Bldg., Houston, Tex.	19

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Bradish, Beverly B., Skelly Oil Co., 516 N. Fourth St., Albuquerque, N. Mex.	37
Bradish, Ford, independent, 2010 Fort Worth Natl. Bank Bldg., Fort Worth, Tex.	19
Bradley, Everett L., Bradley Bros., 1115 Bitting Bldg., Wichita, Kan.	22
Bradley, Henry Waring, Permian Basin Sample Lab., Box 1653, Midland, Tex.	44
Bradley, Richard Morriss, Cities Service Oil Co., Bartlesville, Okla.	43
Bradley, Wilmont Hyde, U. S. Geol. Survey, Washington, D. C.	45
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Brainerd, Arthur E., Continental Oil Co., Denver, Colo.	22
Bramkamp, Richard Allen, Arabian-American Oil Co., Bahrain Island, Persian Gulf	43
Bramlette, Milton N., Univ. of California, Los Angeles, Calif.	25
Bramlette, William Allen, Carter Oil Co., Box 658, Denver, Colo.	37
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Brankstone, Hugh R., Gulf Oil Corp., 3332 Gulf Bldg., Pittsburgh, Pa.	32
Bransford, James C., consulting, Rm. 507, 210 W. Seventh St., Los Angeles, Calif.	47
Branson, Carl Colton, Shell Oil Co., Inc., Box 1509, Midland, Tex.	40
Branson, Delmar O., Stanolind Oil & Gas Co., Box 660, Tyler, Tex.	41
Branson, E. B., 101 Swallow Hall, Univ. of Missouri, Columbia, Mo.	25
Branson, Edwin Robert, Carter Oil Co., Mt. Pleasant, Mich.	38
Branson, John Wallace, Kansas State College, Manhattan, Kan.	47
Brant, Ralph A., The Atlantic Refg. Co., Kennedy Bldg., Tulsa, Okla.	26
Brantly, John E., Drlg. & Explor. Co., Inc., 600 Continental Bldg., Dallas, Tex.	18
Brasted, Fred, Philips Petr. Co., Bartlesville, Okla.	30
Brauchli, Rud W., Anderson-Prichard Oil Corp., 909 Apco Tower, Oklahoma City, Okla.	23
Braugh, Donald D., Sun Oil Co., San Jacinto Bldg., Beaumont, Tex.	21
Brankstein, Jules, Shell Oil Co., Inc., Box 1817, Jackson, Miss.	37
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Bray, Vinton Arthur, C. I. E. P. S. A., Alcola 31, Atico A, Madrid, Spain.	41
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Brehm, Ralph C., consulting, 528 Clayton Bldg., Sapulpa, Okla.	27
Breitenstein, Robert S., The Texas Petr. Co., Maracaibo, Venezuela, S. A.	29
Bremer, Bernhard E., The Texas Co., Box 252, New Orleans, La.	30
Brewer, John Edward, Globe Oil Co., 613 Colcord Bldg., Oklahoma City, Okla.	43
Briard, Vernon E., The Texas Co., Box 2332, Houston, Tex.	37
Brice, John W., Standard Oil Co. (N. J.), Rm. 2771, 30 Rockefeller Plaza, New York, N. Y.	28
Bricker, John F., Humble Oil & Refg. Co., New Orleans, La.	36
Brier, Ervin Ernest, Continental Oil Co., Lafayette, La.	42
Bright, Anna Lou, Humble Oil & Refg. Co., Box 2180, Houston, Tex.	45
Bright, Eleanor Jane Young, Rt. 2, Box 350, Ventura, Calif.	45
Bright, Richard Thatcher, Mercantile Natl. Bank, Box 3068, Dallas, Tex.	25
Brill, Virgil August, Brill & Cannan, 1418 City Natl. Bank Bldg., Houston, Tex.	33
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Brineman, John H., Socony-Vacuum Oil Co. of Colombia, Apt. Aereo 4034, Bogota, Colombia, S. A.	47
Brinker, Willard Franklin, Cities Service Oil Co., Box 792, Casper, Wyo.	46
Brinkerhoff, Ira A., Cummins, Berger & Fishny, 1716 Natl. Standard Bldg., Houston, Tex.	29
Brinnon, William B., Magnolia Petr. Co., Box 265, Artesia, N. Mex.	46
Briscoe, Glenn O., consulting, 5830 Marquita Ave., Dallas, Tex.	22
Bristley, Leon Prestridge, Jr., Gulf Research & Devel. Co., Box 125, Hazlehurst, Miss.	39
Bristol, Hubert Masters, Homer Luttrell, Oil Properties, Effingham, Ill.	41
Britt, Harry Max, Jr., Shamrock Oil & Gas Co., Amarillo, Tex.	41
Broadhurst, William L., U. S. Geol. Survey, 302 W. Fifteenth St., Austin, Tex.	31
Brocato, Charles P., Tide Water-Seaboard Oil Co., Box 2009, Tyler, Tex.	48
Brock, Stephen W., Jr., Cities Service Oil Co., Box 779, Tyler, Tex.	30
Brockway, E. R., independent, 256 Carrollton, Shreveport, La.	24
Brockway, LeValley Irving, Gulf Research & Devel. Co., Box 2038, Pittsburgh, Pa.	45
Brodek, Ralph E., Western Gulf Oil Co., Bakersfield, Calif.	47
Brodie, Gerson Herzl, consulting, Box 1581, Abilene, Tex.	39
Brodrick, William Morris, Anderson-Prichard Oil Corp., 314 Orpheum Bldg., Wichita, Kan.	45
Brokaw, Albert D., Brokaw, Dixon & McKee, 120 Broadway, New York, N. Y.	22
Brokaw, John M., Jr., Pure Oil Co., Box 2300, Houston, Tex.	40

Bronner, Finn Eyolf, U. S. Army, Corps of Engineers, 751 S. Figueroa St., Los Angeles, Calif.	43
Brookby, Harry Dudley, Phillips Petr. Co., Bartlesville, Okla.	47
Brookings, Henry Nason Kinney, Phillips Petr. Co., Box 1720, Shreveport, La.	46
Brooks, Barbara Ellen, 1135 Parkwood Blvd. Schenectady, N. Y.	47
Brooks, Benton Snow, Jr., Champlin Oil & Refg. Co., Wichita, Kan.	39
Brooks, Frank M., Eldorado Refg. Co., Box 551, Eldorado, Kan.	36
Brooks, James Andrew, Jr., Humble Oil & Refg. Co., Box 2180, Houston, Tex.	46
Brooks, Olin D., Humble Oil & Refg. Co., Box 2025, Tyler, Tex.	30
Brooks, Tennant Julian, c/o Glenn C. Ferguson, Professional Bldg., Bakersfield, Calif.	44
Broomfield, R. A., Jr., consulting, 312 Booker Bldg., Artesia, N. Mex.	28
Brossard, Eugene E., Aereovias Occidentales, Apt. 23, San Jose, Costa Rica, C. A.	35
Broughton, Martin Napoleon, The Texas Co., Box 252, New Orleans, La.	33
Broussard, Charles Hugh, Independent Explor. Co., 901 Esperson Bldg., Houston, Tex.	40
Broussard, David Franklin, Yegua Corp., 2302 Esperson Bldg., Houston, Tex.	38
Broussard, E. Chester, Jergins Oil Co., 1323 City Natl. Bank Bldg., Houston, Tex.	46
Broussard, Lloyd J., consulting, 2402 Esperson Bldg., Houston, Tex.	38
Broussard, Marion Ursin, The Superior Oil Co., Houston, Tex.	43
Brouwer, Luitzen Egbertus Jan, Shell Oil Co., Inc., Odessa, Tex.	38
Brown, Augustus Bart, Mudge Oil Co., 1500 Gulf States Bldg., Dallas, Tex.	37
Brown, Charles Spencer, Bay Petr. Corp., Wichita, Kan.	47
Brown, Frank E., Republic Explor. Co., Box 2208, Tulsa, Okla.	43
Brown, Gilbert LeRoy, Forest Oil Corp., Milam Bldg., San Antonio, Tex.	45
Brown, Glen Francis, U. S. Geol. Survey, Evanston, Ill.	42
Brown, H. Travis, The Geologist Co., Inc., Box 1291, Oklahoma City, Okla.	36
Brown, Hart, Brown Geophysical Co., Box 6005, Houston, Tex.	42
Brown, Henry Wilder, Carter Oil Co., Box 801, Tulsa, Okla.	45
Brown, Ira Otho, independent, Box 179, Lockhart, Tex.	24
Brown, J. Albert, Sohio Petr. Co., Damron Bldg., Owensboro, Ky.	39
Brown, J. Earle, consulting, 1112 Sinclair Bldg., Fort Worth, Tex.	20
Brown, Jack Harvey, consulting, 709 Brown Bldg., Wichita, Kan.	46
Brown, James Chapman, Amalgamated Banket Areas, Ltd., Tarkwa, Gold Coast Colony, Africa.	27
Brown, John Lovelace, Pure Oil Co., Box 1141, Jackson, Miss.	45
Brown, Leonard Irving, The Calif. Co., 1818 Canal Bldg., New Orleans, La.	42
Brown, Leslie Thomas, Pure Oil Co., Box 671, Midland, Tex.	46
Brown, Merritt H., consulting, Apt. 405, 615 S. Denver, Tulsa, Okla.	29
Brown, Orman Pearson, Shell Oil Co., Inc., Denver, Colo.	42
Brown, Otto E., Gulf Oil Corp., Durango, Colo.	31
Brown, Prentice F., Honolulu Oil Corp., Box 1301, Midland, Tex.	29
Brown, Robert, consulting, 205 Aldridge Hotel, Shawnee, Okla.	30
Brown, Robert Wesley, Cooperative Refg. Assn., 511 Pickwick Bldg., Kansas City, Mo.	20
Brown, Samuel B., consulting, 5812 Harrisburg Blvd., Houston, Tex.	29
Brown, Silas C., U. S. Geol. Survey, Box 933, Phoenix, Ariz.	41
Brown, Thomas Walter, Brown Fence Co., Chattanooga, Tenn.	48
Brown, Vergil Neal, consulting, Commerce Exchange Bldg., Oklahoma City, Okla.	23
Brown, William F., consulting, Box 302, Mt. Pleasant, Mich.	30
Browne, Gerard Lakin, 115 Church St., Carmi, Ill.	44
Browne, Richard Vernon, Syria Petr. Co., Ltd., Aleppo, Syria	38
Browning, Chloe A., Sinclair-Prairie Oil Co., Maysville, Okla.	45
Browning, Iley B., consulting, Box 126, Ashland, Ky.	21
Browning, John Mackintosh, Tropical Oil Co., Bogota, Colombia, S. A.	46
Bruce, George H., Aladdin Petr. Corp., Petr. Bldg., Wichita, Kan.	25
Brundall, Laurence, Geophoto Services, Inc., 305 E. & C. Bldg., Denver, Colo.	36
Bruner, Frank Allison, Stanolind Oil & Gas Co., Box 1518, Lake Charles, La.	45
Bruyere, Alan, The Texas Co., Box 2332, Houston, Tex.	19
Bruyere, Richard Newbold, The Texas Co., Box 1003, Amarillo, Tex.	45
Bryan, B. F., B. & B. Well Service, Box 945, Robstown, Tex.	44
Bryan, Carl L., Gulf Refg. Co., Box 1731, Shreveport, La.	37
Bryan, Francis Lackner, Schlumberger Well Surveying Corp., Box 1171, Coalinga, Calif.	43
Bryan, Frank, consulting, Nelson, Okla.	19
Bryan, John Victor, independent, Box 344, Chickasha, Okla.	47
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Bryant, Howard S., Skelly Oil Co., Skelly Bldg., Tulsa, Okla.	27
Bryson, Robert P., U. S. Geol. Survey, Washington, D. C.	44
Buchanan, George S., Sohio Petr. Co., 614 Mellie Esperson Bldg., Houston, Tex.	25
Bucher, John Eric, Magnolia Petr. Co., Box 633, Midland, Tex.	39

Buchner, Carl F., Mayville, Wis.	26
Buchner, Harry M., Carter Oil Co., Box 1730, Shreveport, La.	41
Buck, Charles E., Skelly Oil Co., Jackson, Miss.	39
Buck, Cleo Eugene, Humble Oil & Refg. Co., Box 1271, Corpus Christi, Tex.	35
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Buck, Loren I., consulting, 338 N. Parkwood Lane, Wichita, Kan.	35
Buck, Richard D., consulting 1704 N. Market, Shawnee, Okla.	46
Buckley, Stuart Edward, Humble Oil & Refg. Co., Box 2180, Houston, Tex.	44
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Buckwalter, Tracy V., Jr., Univ. of Michigan, Ann Arbor, Mich.	44
Budd, Montgomery Randolph, Hercules Powder Co., Wilmington, Del.	41
Buddenhagen, H. J., Shell Oil Co., Inc., 1008 W. Sixth St., Los Angeles, Calif.	31
Buehler, Karl Martin, J. M. Huber Corp., Box 2098, Denver, Colo.	42
Buehner, John Hubert, The Ohio Oil Co., Marshall, Ill.	40
Buffington, Edwin Couger, Calif. Inst. of Tech., Pasadena, Calif.	47
Bugbee, James McKean, Shell Oil Co., Box 2099, Houston, Tex.	40
Buie, Bennett Frank, Univ. of South Carolina, Columbia, S. Car.	38
Bullard, Edgar F., Stanolind Oil & Gas Co., Box 591, Tulsa, Okla.	23
Bullard, Fred M., Univ. of Texas, Austin, Tex.	20
Bunch, Rosella Leota, Shell Oil Co., Inc., Box 2037, Tyler, Tex.	47
Bundy, Douglas, M. H. Whittier Co., Ltd., Los Angeles, Calif.	39
Bunn, John R., Southwest Drlg. Co., 325 W. Fourth St., Tyler, Tex.	26
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Burbridge, Charles Edmunds, Jr., Cia. Minera y Refinadora Mexicana, S. A., Estacion de Wadley, S. L. P., Mexico, D. F., Mex.	34
Burch, Earl Marvin, Stanolind Oil & Gas Co., Box 1092, Shreveport, La.	44
Burchard, Frederic L., DeGolyer & MacNaughton, 1000 Continental Bldg., Dallas, Tex.	39
Burchfiel, Hugh Lee, Standard Oil Co. of Tex., Petr. Bldg., Houston, Tex.	23
Burditt, Marvin Reece, Amerada Petr. Corp., Box 2040, Tulsa, Okla.	48
Burford, Selwyn O., Humble Oil & Refg. Co., Tyler, Tex.	26
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Burger, Jean Jacques, Societe Cheriffienne des Petroles, Petitjean, French Morocco	47
Burgl, Hans, consulting, Laakirchen, Olling 14, Ob. Ost., Austria	40
Burke, Doyle Michael, The Texas Co., Shawnee, Okla.	42
Burke, James Dan, Seaboard Oil Co., Box 601, Corpus Christi, Tex.	38
Burke, Ray Albert, Stanolind Oil & Gas Co., Box 3092, Houston, Tex.	46
Burke, William Henry, Shell Oil Co., Inc., Box 1191, Tulsa, Okla.	44
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Burnett, T. J., Humble Oil & Refg. Co., Box 2025, Tyler, Tex.	30
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Burr, Ian Laurence, Shell Explor. Party, Shell Co. of West Africa, Lagos Nigerea	45
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Burt, Roy A., Burlington Oil Co., 1101 Burlington Ave., N. Kansas City, Mo.	20
Burner, Evan Hughes, Standard Oil Co. of Calif., 11-C Camp, Taft, Calif.	45
Burton, George E., Sun Oil Co., 6th Fl., Turner Hotel, Gainesville, Tex.	17
Burton, Joseph M., Union Oil Co. of Calif., 1134 Commerce Bldg., Houston, Tex.	46
Burt, John G., Shell Oil Co., Inc., 1008 W. Sixth St., Los Angeles, Calif.	19
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Bush, Frederic A., Sinclair Oil Corp., Rm. 2261, 630 Fifth Ave., New York, N. Y.	31
Bush, Robert Ewell, Lane-Wells Co., Box 1709, Longview, Tex.	41
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Butcher, Walter William, Creole Petr. Corp., Apt. 172, Maracaibo, Venezuela, S. A.	44
Butcher, William Sherman, 38 Barnstable Rd., West Newton, Mass.	46
Butler, John Weston, Jr., Phillips Venezuelan Oil Co., Apt. 1031, Caracas, Venezuela, S. A.	39
Butler, Robert James, Carter Oil Co., Purcell, Okla.	47
Butt, William Horace, The Atlantic Refg. Co., Kennedy Bldg., Tulsa, Okla.	32

Buttermore, Paul M., Danciger Oil & Refg. Co., W. T. Waggoner Bldg., Fort Worth, Tex.	27
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Bybee, Halbert Homer, Carter Oil Co., Box 568, Mattoon, Ill.	40
Bybee, Robert William, Humble Oil & Refg. Co., Box 291, Gonzales, Tex.	41
Bychok, Victor, The Atlantic Refg. Co., Box 2819, Dallas, Tex.	47
Byers, John William, McCollum Explor. Co., 853 Esperson Bldg., Houston, Tex.	37
Byram, John Perkins, Sandy Ridge Oil Co., 609 West Texas Utilities Bldg., Abilene, Tex.	38
Byram, Ronald W., R. W. Byram & Co., Box M., Capitol Sta., Austin, Tex.	24
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Cagle, Joe Maxwell, Sun Oil Co., Beaumont, Tex.	46
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Calahan, Luther Weldon, The Texas Co., Box 252, New Orleans, La.	38
Caldwell, Eleanor Thompson, Humble Oil & Refg. Co., Box 506, Tallahassee, Fla.	45
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Calvert, Warren Lytle, The American Explor. Service, Inc., Oklahoma City, Okla.	39
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Cameron, Louis Gerin, consulting, 817 Giddens-Lane Bldg., Shreveport, La.	45
Camminati-Cortes, Luis, International Petr. Co., Negritos, Talara, Peru, S. A.	45
Camp, John F., Jr., John F. Camp & Sons, 1103 Natl. Bank of Commerce Bldg., San Antonio, Tex.	38
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Campbell, Curran Roland, Stanolind Oil & Gas Co., Box 3092, Houston, Tex.	47
Campbell, Francis Faulkner, Amerada Petr. Corp., Box 2049, Tulsa, Okla.	34
Campbell, Harry A., Jergins Oil Co., Rt. 5, Box 475, Bakersfield, Calif.	25
Campbell, Ian, Calif. Inst. of Tech., Pasadena, Calif.	26
Campbell, John Leslie Putnam, Lane-Wells Co., 2002 S. Wayside Dr., Houston, Tex.	39
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Campbell, Lois Jeannette, 2145 Central Grove Ave., Toledo, Ohio.	47
Campbell Robert B., consulting, Box 62, Gulf Hammock, Fla.	23
Campbell, Thomas Brown, Woodley Petr. Co., Tyler, Tex.	45
Campbell, William Robert, Stanolind Oil & Gas Co., Box 3092, Houston, Tex.	38
Campo, Henry Andrew, The Atlantic Refg. Co., Shawnee, Okla.	41
Canada, William Richards, Magnolia Petr. Co., Box 872, Lake Charles, La.	36
Candela, Alvin, Hiawatha Oil & Gas Co., 1142 Milam Bldg., San Antonio, Tex.	47
Canfield, Charles Reiter, Stanolind Oil & Gas Co., Houston, Tex.	35
Cannan, Morris, consulting, 1105 Milam Bldg., San Antonio, Tex.	41
Cannon, Joe, consulting, 609 McBurnett Bldg., San Angelo, Tex.	28
Cannon, R. L., Cannon & Cannon, 609 McBurnett Bldg., San Angelo, Tex.	23
Canon, Joe, consulting, 202 Ridglea Dr., Midland, Tex.	38
Cantrell, Cyrus Duncan, Jr., Phillips Petr. Co., Box 791, Midland, Tex.	45
Cantrell, Peggy Francis Parthenia, 416 W. Tenth, Bristow, Okla.	45
Cantrell, Ralph B., c/o C. V. Hagen, 2518 Gulf Bldg., Houston, Tex.	40
Capen, Maxwell Gary, Seaboard Oil Co. of Del., Box 7, Bakersfield, Calif.	46
Cardwell, D. Harold, Sun Oil Co., Box 1415, San Angelo, Tex.	30
Cardwell, William Henry, Seaboard Oil Co. of Del., 1400 Continental Bldg., Dallas, Tex.	39
Carey, Hillard W., Houston Natural Gas Corp., Houston, Tex.	36
Carey, S. Warren, Univ. of Tasmania, Hobart, Tasmania.	36
Carlisle, Albert B., Sohio Petr. Co., Mt. Vernon, Ill.	47
Carlisle, Fredrick Macklin, International Cementers, Inc., Box 5005, Long Beach, Calif.	46
Carlson, Charles G., consulting, 922 Thompson Bldg., Tulsa, Okla.	24

Carlson, Stanley A., Richfield Oil Corp., Box 1710, Bakersfield, Calif.	42
Carlton, Dave P., Humble Oil & Refg. Co., 901 Humble Bldg., Houston, Tex.	20
Carlton, Jane T., 1235 Como Blvd., St. Paul, Minn.	45
Carman, Ann Oakley, Continental Oil Co., 601 W. Fifth St., Los Angeles, Calif.	45
Carman, Katharine W., consulting, Water St., Newburgh, Ind.	36
Carmody, Robert Arthur, Gulf Oil Corp., 1107 Union Natl. Bank Bldg., Wichita, Kan.	36
Carpenter, Charles B., U. S. Bureau of Mines, 450 Federal Bldg., Dallas, Tex.	34
Carpenter, E. Gail, consulting, 240 N. Pinecrest, Wichita, Kan.	26
Carpenter, Everett, consulting, R. F. D. 1, Shawnee, Okla.	21
Carpenter, M. E., consulting, 344 Key Bldg., Oklahoma City, Okla.	25
Carpenter, Robert Gordon, Keystone Explor. Co., 2813 Westheimer Rd., Houston, Tex.	45
Carr, George W., Carr Geophysical Co., 1334 Commerce Bldg., Houston, Tex.	26
Carrey, Albert A., consulting, 529 E. Roosevelt Rd., Long Beach, Calif.	44
Carrier, John B., The Superior Oil Co., 2211 Apco Tower, Oklahoma City, Okla.	46
Carroll, Don L., U. S. Geol. Survey, Dept. of the Interior, Washington, D. C.	44
Carsey, J. Ben, Humble Oil & Refg. Co., Box 2180, Houston, Tex.	26
Carstens, Frederick Davenport, Humble Oil & Refg. Co., Box 2180, Houston, Tex.	47
Carter, Charles William, Union Oil Co. of Calif., Houston, Tex.	39
Carter, Devere V., Magnolia Petr. Co., Box 900, Dallas, Tex.	28
Carter, Frank B., General Petr. Corp., 1032 Higgins Bldg., 108 W. Second St., Los Angeles, Calif.	26
Carter, George R., Gulf Oil Corp., Box 1150, Midland, Tex.	37
Carter, Keegan, Gulf Refg. Co., Box 307, Laurel, Miss.	47
Carter, Roland White, Seismograph Service Corp., Box 1590, Tulsa, Okla.	43
Carter, Stuart Lyle, Continental Oil Co., 1024 Continental Oil Bldg., Denver, Colo.	47
Cartmell, William Martin, consulting, 528 Clayton Bldg., Sapulpa, Okla.	42
Cartwright, Lon D., Jr., Union Oil Co., 1134 Commerce Bldg., Houston, Tex.	24
Cartwright, Weldon Emerson, Pan-American Prod. Co., 1245 Melie Esperson Bldg., Houston, Tex.	35
Carver, George E., Jr., Kerr-McGee Oil Industries, Inc., Kerr-McGee Bldg., Oklahoma City, Okla.	47
Case, Leslie C., Gulf Oil Corp., Box 661, Tulsa, Okla.	26
Case, William B., Shell Oil Co., Inc., 30 Rockefeller Plaza, New York, N. Y.	22
Casey, Sam Russel, Jr., Woodley Petr. Co., Box 1403, Houston, Tex.	38
Cash, Thornton C., Humble Oil & Refg. Co., Box 2025, Tyler, Tex.	23
Cashin, D'Arcy M., consulting, 705 Natl. Standard Bldg., Houston, Tex.	19
Cashin, Richard Carl, Phillips Petr. Co., Pauls Valley, Okla.	48
Cassel, Chester, Union Oil Co. of Calif., Casilla 716, Asuncion, Paraguay, S. A.	30
Cassingham, Robert L., consulting, 1231 N. Beard, Shawnee, Okla.	27
Cast, Richard Frederick, Seismograph Div., Phillips Petr. Co., Box 380, Pauls Valley, Okla.	43
Casteel, Sanford H., consulting, 807 Fort Worth Natl. Bank Bldg., Fort Worth, Tex.	30
Caster, Ermil Leslie, Arkansas Natural Gas Corp., Shreveport, La.	28
Caster, Kenneth E., Univ. of Cincinnati, Cincinnati, Ohio.	36
Caswell, Charles Alfred, c/o T. H. McCasland, McCasland Bldg., Duncan, Okla.	48
Cathcart, James Bachelder, Jr., U. S. Geol. Survey, Box 1390, Plant City, Fla.	41
Cathcart, Stanley Holman, Pennsylvania Geol. Survey, Harrisburg, Pa.	47
Caudri, Cornelia Marguerite Brame, Tropical Oil Co., Bogota, Colombia, S. A.	41
Cave, Harold Sergius, Phillips Petr. Co., Box 1257, Roswell, N. Mex.	23
Caver, William Frank, Box 187, Kilgore, Tex.	42
Caylor, Garth William, consulting, 206 Elm Oil Bldg., Tulsa, Okla.	38
Cederstrom, Dagfin John, U. S. Geol. Survey, Box 1836, Univ. Sta., Charlottesville, Va.	41
Cerini, William Ferdinand, Union Oil Co. of Calif., Union Oil Bldg., Los Angeles, Calif.	45
Cerkel, J. David, Jr., U. S. Geol. Survey, Federal Works Bldg., Washington, D. C.	36
Cesinger, E. F., Westmount Oil Co., 512 Continental Bldg., Dallas, Tex.	27
Chaddick, William Monroe, Jr., Sun Oil Co., Box 2431, Corpus Christi, Tex.	35
Chakravorty, Sailendra Kumar, 1800 Illinois St., Lawrence, Kan.	47
Chalupnik, Elsie Bernardine, Barnsdall Oil Co., 604 Driscoll Bldg., Corpus Christi, Tex.	44
Chamberlain, Virgil Ralph, consulting, Box 1474, Great Falls, Mont.	40
Chambers, Lawrence Shiner, Seaboard Oil Co., Rm. 970, 417 S. Hill St., Los Angeles, Calif.	42
Chambers, Ralph David, Richfield Oil Corp., Midland, Tex.	45
Chambers, Robert J., Phillips Petr. Co., 1005 City Natl. Bank Bldg., Houston, Tex.	38
Champion, Oscar R., Alder Oil Co., 1203 Fort Worth Natl. Bank Bldg., Fort Worth, Tex.	30
Chapell, Donald Owen, Sunray Oil Corp., 1610 Milam Bldg., San Antonio, Tex.	36
Chapin, Theodore, Petr. Advisers, Inc., 60 Wall Tower, New York, N. Y.	23
Chapman, Guy Edgar, Chapman Oil Co., Taylor Bldg., Mt. Pleasant, Mich.	28

Chapman, Martin Edward, Chemical Process Co., 312 Thompson Bldg., Tulsa, Okla.	39
Chapman, Robert Mills, U. S. Geol. Survey, Box 1088, Fairbanks, Alaska	47
Chapman, Richard Thomas, Stanolind Oil & Gas Co., Box 1092, Shreveport, La.	40
Chappell, Walter M., Texas Petr. Co., Apt. Postal 877, Bogota, Colombia, S. A.	40
Chappuis, Louis C., consulting, 437 S. Hill St., Los Angeles, Calif.	27
Charles, Homer H., Phillips Petr. Co., Bartlesville, Okla.	25
Charrin, Paul, consulting, Union Natl. Bank Bldg., Houston, Tex.	28
Chase, Carlos Louis, The Texas Co., Box 1270, Midland, Tex.	40
Chase, Gerald Warren, Oklahoma Geol. Survey, Norman, Okla.	47
Chase, James L., consulting, 210 Grand Ave., Long Beach, Calif.	22
Chase, William Lynn, Great Eastern Mining Co., Box 436, Silverton, Colo.	40
Chasey, Kenneth LeMay, consulting, 1003 S. Ash St., Wichita, Kan.	40
Chasteen, Lawrence W., Union Oil Co. of Calif., 617 W. Seventh St., Los Angeles, Calif.	47
Chata, Abdou Ali, Standard Oil Co. of Egypt, 22 Sharia Kasr el Nil, Cairo, Egypt	46
Chauviere, Arnold Charles, Louisiana Geol. Survey, Box 8847, Univ. Sta., Baton Rouge, La.	47
Chawner, William Donald, Carter Oil Co., Box 305, Olympia, Wash.	29
Cheesman, Beynon Sale, The Atlantic Refg. Co., Andrews, Tex.	43
Cheney, M. G., Anzac Oil Corp., Box 846, Coleman, Tex.	19
Chenoweth, Philip Andrew, 14 Hunts Lane, Brooklyn, N. Y.	47
Chesney, Robert William, Magnolia Petr. Co., Box 607, Lindsay, Okla.	47
Cheyney, Alvin E., Sinclair Prairie Oil Co., Wichita, Kan.	21
Chickering, Wallace Wylie, Creole Petr. Corp., Apt. 35, Barcelona, Venezuela, S. A.	26
Childerhose, Allen J., The Texas Co., Box 2332, Houston, Tex.	30
Childers, Aimer Floyd, Jr., Gulf Oil Corp., Houston, Tex.	45
Childs, Orlo E., Colgate Univ., Hamilton, N. Y.	46
Childs, Theodore Scott, Jr., c/o P. P. Goudkoff, Pasadena, Calif.	41
Chilton, James Ryder, McColl-Frontenac Oil Co., Ltd., 809 Fourth St. West, Calgary, Alta., Canada	41
Choate, Bruce Murrow, The Atlantic Refg. Co., Box 895, Lake Charles, La.	44
Chorney, Raymond, Pacific Western Oil Corp., 311 S. Center St., Casper, Wyo.	44
Christensen, H. E., The Texas Co., Box 2100, Denver, Colo.	29
Christenson, Alton Carl, Stanolind Oil & Gas Co., Box 501, Tulsa, Okla.	40
Christie, Laurence G., Shell Oil Co., Inc., 50 W. Fiftieth St., New York, N. Y.	25
Christie, Robert S., Amerada Petr. Corp., Box 1348, Fort Worth, Tex.	25
Christner, D. D., Continental Oil Co., 1710 Fair Bldg., Fort Worth, Tex.	24
Christner, Harold Reed, consulting, Weslaco, Tex.	43
Chronic, Byron John, Jr., 904 Farnald Hall, Columbia Univ., New York, N. Y.	46
Chun, Harold August, Texas Gulf Prod. Co., Houston, Tex.	38
Church, Charles R., Jr., Humble Oil & Refg. Co., 863 Humble Bldg., Houston, Tex.	31
Church, Clifford C., Tide Water Assoc. Oil Co., 79 New Montgomery St., San Francisco, Calif.	30
Church, Harry Victor, Jr., Shell Oil Co., Inc., Box 999, Bakersfield, Calif.	46
Claiborne, Ray E., independent, 3417 Bellaire Dr., S., Fort Worth, Tex.	38
Clair, Joseph Robinson, Great Lakes Carbon Corp., 501 Petr. Bldg., Wichita, Kan.	41
Clare, Frederick Bernard, Imperial Oil, Ltd., 335 Seventh St., W., Calgary, Alta., Canada	47
Clark, Alexander, Shell Oil Co., Inc., Box 720, Casper, Wyo.	36
Clark, Beryl L., Stanolind Oil & Gas Co., Bellaire, Tex.	47
Clark, Charles Chester, Carter Oil Co., Box 1730, Shreveport, La.	47
Clark, Charles Koogle, Pure Oil Co., 410 Second Natl. Bank Bldg., Saginaw, Mich.	37
Clark, Charles R., Kerr-McGee Oil Industries, Inc., Kerr-McGee Bldg., Oklahoma City, Okla.	45
Clark, Chester C., Union Prod. Co., Box 1407, Shreveport, La.	19
Clark, Clare M., Cities Service Oil Co., 1440 Esperson Bldg., Houston, Tex.	28
Clark, Frank Rinker, 1524 S. Owasso, Tulsa, Okla.	20
Clark, Frank T., Cities Service Oil Co., 1440 Mellie Esperson Bldg., Houston, Tex.	23
Clark, G. Conrad, Stanolind Oil & Gas Co., Box 660, Tyler, Tex.	31
Clark, George Howard, The Texas Co., Box 2332, Houston, Tex.	33
Clark, Glenn C., Continental Oil Co., Ponca City, Okla.	19
Clark, H. Smith, consulting, 1016 Sinclair Bldg., Fort Worth, Tex.	22
Clark, Harold Joseph, Conservation Comm. of Calif. Operators, 1160 Subway Terminal Bldg., Los Angeles, Calif.	41
Clark, Howard, consulting, 1724 S. Newport, Tulsa, Okla.	23
Clark, James Tate, Phillips Petr. Co., Box 3540, Jackson, Miss.	39
Clark, James Edward, Bay Petr. Co., 1010 Brown Bldg., Wichita, Kan.	41
Clark, John W., Magnolia Petr. Co., Box 900, Dallas, Tex.	27
Clark, Joseph Marsh, consulting, 602 S. Erie, Tulsa, Okla.	29

Clark, L. W., Amerada Petr. Corp., Box 2040, Tulsa, Okla.	29
Clark, Leslie M., Shell Oil Co. of Canada, Ltd., Bank of Toronto Bldg., Calgary, Alta., Canada	26
Clark, Lorin D., U. S. Geol. Survey, Iron River, Mich.	43
Clark, Marie J., Richfield Oil Corp., 430 Richfield Bldg., 555 S. Flower St., Los Angeles, Calif.	47
Clark, Norman Duane, Lion Oil Co., 802 Union Natl. Bank Bldg., Wichita, Kan.	38
Clark, Paul Henry, Humble Oil & Refg. Co., 927 Humble Bldg., Houston, Tex.	41
Clark, Robert P., Phillips Petr. Co., Bartlesville, Okla.	27
Clark, Robert Scarth, Phillips Petr. Co., Box 421, Tallahassee, Fla.	37
Clark, Robert W., Western Gulf Oil Co., 1260 Subway Terminal Bldg., Los Angeles, Calif.	18
Clark, Robey H., Magnolia Petr. Co., Box 1828, Oklahoma City, Okla.	47
Clark, Roswell Dale, Clark & Cowden Drlg. Corp., Box 567, Duncan, Okla.	45
Clark, Samuel L., Jr., Royal Oil & Gas Corp., 307 Commercial Natl. Bank Bldg., Shreveport, La.	44
Clark, Stuart K., Continental Oil Co., Ponca City, Okla.	19
Clark, W. C., Independent Explor. Co., 901 Esperson Bldg., Houston, Tex.	26
Clark, William A., Jr., consulting, 952 Esperson Bldg., Houston, Tex.	26
Clark, Willis Kenley, The Superior Oil Co., Box 1382, Shreveport, La.	36
Clarke, Ralph L., Gulf Oil Corp., Box 661, Tulsa, Okla.	42
Clarke, Robert L., Union Oil Co., Midland, Tex.	40
Clarkson, William George, Jr., The Ohio Oil Co., Box 552, Midland, Tex.	38
Classen, Willard J., consulting, Rt. 1, Box 1140, Redwood City, Calif.	23
Clawson, William W., Magnolia Petr. Co., Box 900, Dallas, Tex.	25
Clay, Withers, consulting, Box 42, Largo, Fla.	26
Claypool, C. B., Sun Oil Co., 405 American Natl. Bank Bldg., Beaumont, Tex.	30
Clayton, John Mason, Seaboard Oil Co., 1400 Continental Bldg., Dallas, Tex.	47
Clayton, Neal, Republic Explor. Co., Box 2208, Tulsa, Okla.	45
Clement, George M., The Texas Co., Box 2332, Houston, Tex.	34
Clement, Paul F., Western Gulf Oil Co., 1260 Subway Terminal Bldg., Los Angeles, Calif.	39
Clements, Thomas, Univ. of Southern California, Los Angeles, Calif.	44
Clifford, O. C. Jr., The Atlantic Refg. Co., Magnolia Bldg., Dallas, Tex.	28
Clifton, R. L., Champlin Refg. Co., Enid, Okla.	25
Cline, Wilford L., Carter Oil Co., 514 Orpheum Bldg., Wichita, Kan.	43
Clinkscales, Albert S., consulting, 904 Colcord Bldg., Oklahoma City, Okla.	19
Closuit, Erenst M., independent, 1904 Alamo Natl. Bldg., San Antonio, Tex.	22
Clote, Thomas Anthony, Sunray Oil Co., Philtower Bldg., Tulsa, Okla.	41
Cloud, Preston E., Jr., Museum of Comparative Zoology, Harvard Univ., Cambridge, Mass.	43
Cloud, Wilbur F., Univ. of Oklahoma, Faculty Exchange, Box 343, Norman, Okla.	37
Clowe, Charles E., consulting, Box 88, Ardmore, Okla.	23
Clute, Walker S., consulting, 811 W. Seventh St., Los Angeles, Calif.	41
Coates, George H., independent, 638 Milam Bldg., San Antonio, Tex.	26
Cobb, Howard L., The Atlantic Refg. Co., Box 2810, Dallas, Tex.	43
Cobb, Margaret C., Amerada Petr. Corp., 120 Broadway, New York, N. Y.	26
Cobban, William Aubrey, Johns Hopkins Univ., Baltimore, Md.	41
Cochran, Phil K., Palmer Oil Corp., 518 First Natl. Bank Bldg., Shreveport, La.	23
Cochrane, Wallace Harlon, Carter Oil Co., Seattle, Wash.	48
Cockrum, Earl Conway, Carter Oil Co., Box 72, Carmi, Ill.	45
Cody, Marian Coffman, Apt. 1488, Caracas, Venezuela, S. A.	43
Coel, Eustace J., Gulf States Recycling Co., Box 88, Edinburg, Tex.	27
Coenen, Edward J., General Petr. Corp., Box D, Taft, Calif.	39
Coester, Brower Burroughs, The Atlantic Refg. Co., Box 520, Casper, Wyo.	47
Coffin, R. Clare, Stanolind Oil & Gas Co., Box 591, Tulsa, Okla.	26
Cogen, William Maurice, Shell Oil Co., Inc., Box 2099, Houston, Tex.	37
Cohee, George V., U. S. Geol. Survey, Univ. of Michigan, Ann Arbor, Mich.	37
Cohn, Arthur A., Jr., The Texas Co., 929 S. Broadway, Los Angeles, Calif.	47
Coil, Fay, The Superior Oil Co., Box 510 Midland, Tex.	30
Coldwell, Charles Hutton, Sun Oil Co., Box 2880, Dallas, Tex.	37
Cole, Adna Malone, consulting, Box 42, Coudersport, Pa.	40
Cole, Charles Taylor, consulting, Box 214, Midland, Tex.	37
Cole, Edwin G., Sinclair Prairie Oil Co., 901 Fair Bldg., Fort Worth, Tex.	25
Cole, John Gordon, Cole & Lockwood, 1735 Golden Gate Ave., Los Angeles, Calif.	37
Cole, Mary Jane, Hardin College, Wichita Falls, Tex.	46
Cole, Virgil B., Gulf Oil Corp., 1107 Union Natl. Bank Bldg., Wichita, Kan.	24
Coleman, Hubert Paul, Student Detachment Artillery School, Fort Sill, Okla.	47
Coleman, Tom L., U. S. Geol. Survey, Oklahoma City, Okla.	24
Colle, Jack Overton, c/o Hershal C. Ferguson, 935 Mellie Esperson Bldg., Houston, Tex.	39
Collett, J. Daviss, Assoc. Engineers, Box 6067, Houston, Tex.	38

Colley, Bernard Belden, Tropical Oil Co., Bogota, Colombia, S. A.	38
Collier, John J., Jr., Pure Oil Co., Box 479, Corpus Christi, Tex.	41
Collingwood, D. M., Sun Oil Co., Box 2880, Dallas, Tex.	21
Collins, Burton Wallace, N. Z. Geol. Survey, Box 250, Timaru, South Canterbury, N. Z.	39
Collins, C. Philip, Eastman Oil Well Survey Co., Box 1500, Denver, Colo.	25
Collins, Jack Beverly, U. S. Geol. Survey, Tulsa, Okla.	43
Collins, Philson Delp, Jr., Arabian American Oil Co., Dhahran, Saudi Arabia	44
Collom, Roy E., Kettleman North Dome Assn., 601 W. Fifth St., Los Angeles, Calif.	19
Colson, William Edward, Barnsdall Oil Co., 2212 Esperson Bldg., Houston, Tex.	46
Colton, Howard Franklin, consulting, 807 Milam Bldg., San Antonio, Tex.	36
Combs, Edward Jolley, Sun Oil Co., Old Natl. Bank Bldg., Evansville, Ind.	30
Conant, Louis Cowles, U. S. Geol. Survey, Tuscaloosa, Ala.	44
Condit, D. Dale, Standard-Vacuum Oil Co., 26 Broadway, New York, N. Y.	21
Condon, James Carl, Anderson-Prichard Oil Corp., Orpheum Bldg., Wichita, Kan.	46
Conhaim, Howard J., consulting, Beacon Bldg., Tulsa, Okla.	39
Conkling, R. A., consulting, 904 Colcord Bldg., Oklahoma City, Okla.	17
Conkling, Russell C., consulting, 207 Eastham Bldg., Midland, Tex.	22
Conkling, William Henry, Sun Oil Co., Box 1682, Midland, Tex.	22
Conley, J. N., Seaboard Oil Co. of Del., Continental Bldg., Dallas, Tex.	35
Conrad, Charles S., consulting, 1919 Portsmouth, Houston, Tex.	29
Conrad, Peter Paul, Socony-Vacuum Oil Co., C. A., Apt. 246, Caracas, Venezuela, S. A.	41
Conrad, Stanley Dickson, Richfield Oil Corp., 560 Haberfelde Bldg., Bakersfield, Calif.	47
Conselman, Frank Buckley, consulting, 22 Compton Bldg., Abilene, Tex.	36
Conwell, Cleland Neeper, Stearns-Rogers Mfg. Co., Aurora, Minn.	40
Cook, Carroll E., Argentina Oil Co., Buenos Aires, Argentina, S. A.	22
Cook, Everett Earl, 310 E. State St., Clare, Mich.	38
Cook, Harold J., consulting, Agate, Nebr.	20
Cook, Ian MacLaren, Union Oil Co. of Calif., Calgary, Alta., Canada	45
Cook, Paul Chronical, Keystone Explor. Co., 3813 Westheimer Rd., Houston, Tex.	46
Cooke, Henry Clay, c/o O. G. McClain, 224 Nixon Bldg., Corpus Christi, Tex.	41
Cooke, William Forester, Jr., The Atlantic Refg. Co., Box 1346, Houston, Tex.	42
Cooley, Gerald Allison, Phillips Petr. Co., Hotel Alvin Bldg., Alvin, Tex.	47
Cooley, Ralph S., Natl. Ventilated Awning Co., 36 N. Wilson Way, Stockton, Calif.	38
Coombs, John Robert, Magnolia Petr. Co., Box 900, Dallas, Tex.	45
Cooper, C. Harrison, British-American Oil Prod. Co., 2407 First Natl. Bldg., Oklahoma City, Okla.	37
Cooper, Chalmer Lewis, U. S. Geol. Survey, Washington, D. C.	26
Cooper, Herschel H., consulting, 1015 Milam Bldg., San Antonio, Tex.	25
Cooper, James Blair, U. S. Geol. Survey, Geol. Annex, Iowa City, Iowa	41
Cooper, Russell Calvin, Sinclair Wyoming Oil Co., 620 Court Bldg., Evansville, Ind.	38
Coote, George Frederick, Imperial Oil Co., 339 Seventh Ave., W., Calgary, Alta., Canada	45
Copass, Jack M., Amerada, Petr. Corp., Box 2040, Tulsa, Okla.	27
Copeland, Richard G., The Ohio Oil Co., Box 2495, West Jackson, Miss.	27
Copeland, Robert R., Jr., Bates & Cornell, Box 1000, Lafayette, La.	37
Corbett, Clifton S., Socony-Vacuum Oil Co., 905 Lancaster Bldg., Calgary, Alta., Canada	19
Corbin, Milton Wallace, The Chicago Corp., Box 1047, Shreveport, La.	38
Corby, Grant W., c/o James E. Neville, 411 W. Fifth St., Los Angeles, Calif.	26
Cordry, C. D., Gulf Oil Corp., Box 1290, Fort Worth, Tex.	29
Corey, George Simpson, Shell Oil Co., Inc., Box 1500, Midland, Tex.	40
Corey, William Henry, Continental Oil Co., 601 W. Fifth St., Los Angeles, Calif.	32
Corman, Hyman, Jergins Oil Co., 804 Milam Bldg., San Antonio, Tex.	37
Cornelius, Lee Henri, Pure Oil Co., 118 W. Sixth St., Tulsa, Okla.	41
Cornell, Lee H., Stanolind Oil & Gas Co., 429 First Natl. Bank Bldg., Wichita, Kan.	27
Corning, Leavitt, Jr., Jack Ammann Photogrammetric Engineers, 829 N. St. Mary's St., San Antonio, Tex.	30
Cornish, Lou G., American Explor. Co., Box 555, S. L. I., Lafayette, La.	47
Corrigan, Glen Lee, Oklahoma A. & M. College, Stillwater, Okla.	43
Cortes, Henry C., Magnolia Petr. Co., Box 900, Dallas, Tex.	30
Cortes, Henry Cornelius, Jr., consulting, 4328 Windsor Pkwy., Dallas, Tex.	42
Cortright, William D., Tide Water Assoc. Oil Co., Bakersfield, Calif.	34
Coryell, Horace N., Columbia Univ., New York, N. Y.	26
Coryn, F. R., The Texas Co., Box 2420, Tulsa, Okla.	30
Costa, Delbert James, The Superior Oil Co., 2211 Apco Tower, Oklahoma City, Okla.	38
Cotner, Victor, Columbian Carbon Co., 41 E. Forty-second St., New York, N. Y.	27
Cottingham, Kenneth, The Ohio Fuel Gas Co., Columbus, Ohio	28
Cottingham, Virgil E., North Basin Pools Engineering Comm., Box 1851 Midland, Tex.	21

Cotton, James Russell, Permian Basin Sample Lab., Midland, Tex.	47
Couch, Robert Garwood, Socony-Vacuum Oil Co., Apt. 246, Caracas, Venezuela, S. A.	36
Courtier, William H., Phillips Petr. Co., Bartlesville, Okla.	28
Courtney, Chyde Jasper, The Calif. Co., 1818 Canal Bldg., New Orleans, La.	47
Courtney, Edwin Allan, consulting, Box 471, Hammond, La.	46
Couser, Chester Wendell, Carter Oil Co., Manhattan, Kan.	36
Covington, Jerry, Humble Oil & Refg. Co., Box 1600, Midland, Tex.	43
Cowan, Clifton A., Union Oil Co. of Calif., 635 Ricou-Brewster Bldg., Shreveport, La.	47
Cowie, Roger Harrison, Missouri School of Mines, Rolla, Mo.	46
Cox, Alcott B., Jr., Plymouth Oil Co., Shreveport, La.	48
Cox, Benjamin Burton, Gulf Research & Devel. Co., Box 2038, Pittsburgh, Pa.	26
Cox, Herbert Mack, Danciger Oil & Refg. Co., Box 1268, Baton Rouge, La.	40
Cox, Harris J., Western Geophysical Co., 601 W. Fifth St., Los Angeles, Calif.	39
Cox, Robert T., The Atlantic Refg. Co., Box 871, Midland, Tex.	37
Cox, Thomas S., consulting, Scharbauer Hotel, Midland, Tex.	28
Cox, Virginia Jackson, Gulf Oil Corp., Box 1290, Fort Worth, Tex.	45
Cox, Wesley Philip, Socony-Vacuum Oil Co., 26 Broadway, New York, N. Y.	38
Cox, William Edgerton, Humble Oil & Refg. Co., Midland, Tex.	46
Cox, William Jones, Jr., Emory Univ., Emory University, Ga.	47
Craddock, William Percival, Humble Oil & Refg. Co., Baytown, Tex.	47
Craig, Jack Wilson, Gulf Oil Corp., Box 2100, Houston, Tex.	48
Craig, Lawrence Carey, U. S. Geol. Survey, Washington, D. C.	43
Craig, Ross Walter, Stanolind Oil & Gas Co., Box 1518, Lake Charles, La.	45
Craig, T. C., Phillips Petr. Co., Box 1751, Amarillo, Tex.	31
Craig, William Henry, consulting, 204 S. Ave. G., Olney, Tex.	43
Crain, Hugh F., Phillips Petr. Co., 1003 City Natl. Bank Bldg., Houston, Tex.	46
Crain, John Richard, consulting, 910 World Bldg., Tulsa, Okla.	43
Cram, Edward C., Magnolia Petr. Co., Box 900, Dallas, Tex.	39
Cram, Ira H., Pure Oil Co., 35 E. Wacker Dr., Chicago, Ill.	26
Crandall, Kenneth H., The Calif. Co., 1818 Canal Bldg., New Orleans, La.	23
Crandall, Richard R., consulting, 437 S. Hill St., Los Angeles, Calif.	24
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Durgan, Herbert Leonard, Sun Oil Co., San Jacinto Life Bldg., Beaumont, Tex.	37
Durham, Charles Albert, Humble Oil & Refg. Co. Midland, Tex.	39
Durham, James Harmon, Phillips Petr. Co., Denver, Colo.	37
Durham, John Wyatt, Dept. of Paleontology, Univ. of California, Berkeley, Calif.	39
Durkee, Robert R., Gulfshore Oil Co., Esperson Bldg., Houston, Tex.	28
Durrell, Cordell, Univ. of California, Los Angeles, Calif.	38
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Eardley, Armand John, Univ. of Michigan, Ann Arbor, Mich.	43
Eagle, Dolan Hoye, U. S. Geol. Survey, 21 Springbrook Circle, Tuscaloosa, Ala.	45
Earl, Eugene Leonard, British-American Oil Prod. Co., 350 Mellie Esperson Bldg., Houston, Tex.	33
Earl, Glenn M., consulting, 904 Quinby Bldg., 650 S. Grand Ave., Los Angeles, Calif.	37
Earl, Will F., The Ohio Co., 710 Brown Bldg., Wichita, Kan.	25
Earl, Francis, Jr., Phillips Petr. Co., 1211 First Natl. Bldg., Oklahoma City, Okla.	40
Easton, William Heyden, Univ. of Southern California, Los Angeles, Calif.	41
Eaton, Joseph Edmund, consulting, 2062 N. Sycamore Ave., Los Angeles, Calif.	25
Eaton, Robert Wesley, Humble Oil & Refg. Co., Tyler, Tex.	46
Eaves, Everett, Magnolia Petr. Co., Box 1406, Shreveport, La.	35
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Ebmeyer, Gerard E., c/o S. D. Jarvis, Hulman Bldg., Evansville, Ind.	23
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Echols, Dorothy Jung, Pond Fork Oil & Gas Co., Ferguson, Mo.	41
Eckart, Robert R., Jr., Shell Oil Co., Inc., Box 787, Quitman, Tex.	41
Eckenwiler, Cleo W., Slemaker & Herndon, 924 McBirney Bldg., Tulsa, Okla.	32
Eckert, Frank E., Hanley & Bird, Bradford, Pa.	21
Eckhardt, E. A., Gulf Research & Devel. Co., Box 2038, Pittsburgh Pa.	30
Eckis, Rollin, Richfield Oil Corp., 430 Richfield Bldg., Los Angeles, Calif.	36
Eddy, Gerald Ernest, Geol. Survey Div., Dept. of Conservation, Lansing, Mich.	47
Edens, Jack Cloyd, Stanolind Oil & Gas Co., 429 First Natl. Bank Bldg., Wichita, Kan.	43
Edmiston, Elliott K., c/o Luther Mackall, 517 Union Natl. Bank Bldg., Wichita, Kan.	38
Edmund, Rudolph William, Globe Oil Co., 613 Colcord Bldg., Oklahoma City, Okla.	45
Edmunds, Frederic Harrison, Univ. of Saskatchewan, Saskatoon, Sask., Canada.	44
Edson, Dwight J., Edson Petr. Co., 1537 Mellie Esperson Bldg., Houston, Tex.	22
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Edwards, Harold S., Stanolind Oil & Gas Co., Fair Bldg., Fort Worth, Tex.	42
Edwards, Kenneth L., Richmond Explor. Co., Apt. 93, Maracaibo, Venezuela, S. A.	46
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Ehlers, George Marion, Museum of Paleontology, Univ. of Michigan, Ann Arbor, Mich.	46
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Elder, James D., Cooperative Refinery Assn., Wichita, Kan.	47
Elder, Stanley G., Sun Oil Co., Old Natl. Bank Bldg., Evansville Ind.	36
Eley, Jack Burt, Oklahoma Natural Gas Co., Oklahoma City, Okla.	47
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Elliott, Douglas Howard, Tropical Oil Co., Barranquilla, Colombia, S. A.	45
Elliott, Elizabeth Anne, U. S. Geol. Survey, Denver, Colo.	45
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Ellis, John Reese, Carter Oil Co., Box 801, Tulsa, Okla.	42
Elison, Burton Rolland, Standard Oil Co. of Calif., 26 F St., 11-C, Taft, Calif.	38
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Emery, Wilson B., The Ohio Oil Co., Findlay, Ohio	23
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Escallon, Marion Roberta de, Taca de Colombia, Apt. Nacl. 2727, Bogota, Colombia, S. A.	40
Esgen, W. K., Standard Oil Co. of Egypt, S. A., P. O. Bag, Cairo, Egypt	29

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Evans, Frank Garrettson, Jr., Speed Oil Co., Houston, Tex.	28
Evans, Louis H., Calif. State Board of Equalization, Los Angeles, Calif.	24
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Evans, Robert Pierce, Lion Oil Co., El Dorado, Ark.	43
Evans, Vincent, Skelly Oil Co., Box 451, La Junta, Colo.	31
Everett, Rizer, Carter Oil Co., Oklahoma City, Okla.	38
Everett, Robert Walter, Jr., The Texas Co., Box 252, New Orleans, La.	43
Ewbank, Norman Ware, Jr., Ewbank Equipment Co., Independence, La.	43
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Fabre, Gilbert, Magnolia Petr. Co., San Antonio, Tex.	47
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Fagginger-Auer, Willem A., Gulf Oil Corp., Havana, Cuba.	41
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Fahle, Paul Bartlett, Plymouth Oil Co., Rm. 7-B, Ricou-Brewster Bldg., Shreveport, La.	38
Failing, William Earl, Humble Oil & Refg. Co., Paradis, La.	46
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Farley, William Richard, Explor. Dept., Union Sulphur Co., Sulphur, La.	39
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Farmer, Paul Herbert, Brinkerhoff Drlg. Co., 431 Wyoming Natl. Bank Bldg., Casper, Wyo.	47
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Farrand, William Gardner, Sun Oil Co., Old Natl. Bank Bldg., Evansville, Ind.	40
Farrell, Agnes M., U. S. Geol. Survey, Washington, D. C.	26
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Feather, Virgil G., Honolulu Oil Corp., Box 1557, Lubbock, Tex.	38
Fee, Samuel Thomas, Shell Oil Co., Inc., Box 515, Chickasha, Okla.	44
Feister, George Harold, Union Oil Co. of Calif., Santa Maria, Calif.	47
Feldmeyer, Arthur E., The Superior Oil Co., 930 Edison Bldg., Los Angeles, Calif.	39
Feldmiller, Charles Henry, Equitable Gas Co., Pittsburgh, Pa.	45
Fell, Harold B., Simpson-Fell Oil Co., Box 778, Ardmore, Okla.	36
Fellows, Robert Arthur, Pure Oil Co., Box 1398, Billings, Mont.	41
Felts, Wayne Moore, The Texas Co., Boulder City, Nev.	45
Fender, Hollis Blair, Gulf Refg. Co., Box 482, Mattoon, Ill.	42
Fenichell, Melvin Medford, Creole Petr. Corp., Apt. 172, La Salina, Estado Zulia, Venezuela, S. A.	44
Fenn, Ivan J., Salt Dome Oil Corp., 1900 Mellie Esperson Bldg., Houston, Tex.	29
Fenwick, Willis Henry, Brown Geophysical Co., Box 319, Casper, Wyo.	44
Fera, Dan Edwards, Texas Bureau of Economic Geol., Austin, Tex.	40
Ferber, Herbert James, Gulf Research & Devel. Co., Box 375, La Junta, Colo.	39
Ferebee, D. M., The Calif. Co., 1818 Canal Bldg., New Orleans, La.	39
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Ferguson, Carlos Mose, Magnolia Petr. Co., Box 1988, Amarillo, Tex.	39
Ferguson, Fred Travis, The Ohio Oil Co., Box 1168, Tampa, Fla.	44

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Ferguson, John L., Amerada Petr. Corp., Box 2040, Tulsa, Okla.	20
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Ferguson, Kenneth Sears, 1245 Park Row, La Jolla, Calif.	27
Ferguson, Marion Lee, Southwell Map Co., 112 Dwyer Ave., San Antonio, Tex.	39
Ferguson, R. N., consulting, 1332 A. G. Bartlett Bldg., Los Angeles, Calif.	19
Ferguson, Robert Dewitt, U. S. Geol. Survey, Casper, Wyo.	46
Ferguson, William Boyd, Fluorographic Explor. Co., 1517 Second Natl. Bank Bldg., Houston, Tex.	20
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Ferrell, Max Everett, Carter Oil Co., Box 1268, Durango, Colo.	41
Ferrero, Clarence F., Fred M. Manning, Inc., Breckenridge, Tex.	28
Ferris, Bernard Joe, 920 Twelfth St., Golden, Colo.	47
Ferris, Craig, E. V. McCollum & Co., Thompson Bldg., Tulsa, Okla.	45
Feruglio, Egidio S., Inst. del Petroleo, Universidad Nacional, B. Mitre 660, Mendoza, Argentina, S. A.	38
Feth, John Henry, Univ. of Arizona, Tucson, Ariz.	45
Fettke, Charles R., Carnegie Inst. of Tech., Pittsburgh, Pa.	20
Fichter, Hans Jakob K., Caribbean Petr. Co., Apt. 809, Caracas, Venezuela, S. A.	41
Fickel, Raymond Arnold, Sinclair Prairie Oil Co., Box 1242, Amarillo, Tex.	47
Fidlar, Marion Moore, Mountain Fuel Supply Co., Rock Springs, Wyo.	39
Fields, Harry B., Carter Oil Co., Box 291, Vernal, Utah	28
Fiemming, Robert Louis, Skelly Oil Co., Box 44, Velma, Okla.	44
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Finley, Emmett Atkins, Creole Petr. Corp., Apt. 172, Maracaibo, Venezuela, S. A.	46
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Fischer, Alfred George, Univ. of Rochester, Rochester, N. Y.	45
Fischer, LeRoy Fred, Sohio Petr. Co., Box 1667, Shreveport, La.	42
Fischer, Richard Philip, U. S. Geol. Survey, Box 188, Naturita, Colo.	47
Fischer, Victor Nathaniel, C. H. Murphy & Co., 310 First Natl. Bank Bldg., El Dorado, Ark.	38
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Fisher, Frank Lynn, Jr., Ashland Oil & Refg. Co., 514 Citizens Natl. Bank Bldg., Ashland, Ky.	38
Fisher, Gordon Henderson, Gulf Oil Corp., Box 1290, Fort Worth, Tex.	42
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Fisk, Harold N., Louisiana State Univ., Baton Rouge, La.	38
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FitzGerald, James, Jr., independent, Box 1565, Midland, Tex.	25
FitzGerald, Norman D., independent, Box 1772, Abilene, Tex.	44
Fitzgerald, Paul E., Dowell, Inc., 514 Kennedy Bldg., Tulsa, Okla.	30
Fitzgerald, Thomas J., Oceanic Oil Co., Haberfelde Bldg., Bakersfield, Calif.	29
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Fletcher, Roy William, Jr., The Texas Co., Bakersfield, Calif.	46
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Foley, Edward J., Humble Oil & Refg. Co., Box 1236, Roswell, N. Mex.	38
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Fonville, Herman Albert, Colombian Gulf Oil Co., Apt. 4014, Bogota, Colombia, S. A.	27
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Ford, Waldo Emerson, Jr., Los Angeles Board of Education, Los Angeles, Calif.	38
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Forrest, Lesh C., Chanslor-Canfield Midway Oil Co., Professional Bldg., Bakersfield, Calif.	38
Forrester, James Donald, Missouri School of Mines, Rolla, Mo.	47
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Fossa-Mancini, Enrico, Museo de La Plata, La Plata, Argentina, S. A.	31
Fossage, Ernest Willard, Shamrock Oil & Gas Co., Amarillo Bldg., Amarillo, Tex.	37
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Foster, Paul Woodward, Williams College, Williamstown, Mass.	42
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Frey, Alfred P., Shell Oil Co., Inc., Centralia, Ill.	24
Frey, Maurice Gordon, Calif. Research Corp., 200 Bush St., San Francisco, Calif.	45
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Frost, Jay Miles, III, independent, 803 Mellie Esperson Bldg., Houston, Tex.	38
Frost, Victor LeRoy, The Ohio Oil Co., Thompson Bldg., Tulsa, Okla.	45
Fruehling, Siegfried William, Seismograph Service Corp., 709 Kennedy Bldg., Tulsa, Okla.	45
Fry, Earl E., Pan-American Prod. Co., 12th Fl., Mellie Esperson Bldg., Houston, Tex.	40
Frye, John Chapman, Kansas Geol. Survey, Univ. of Kansas, Lawrence, Kan.	44
Fryou, Joe A., Humble Oil & Refg. Co., Box 1271, Corpus Christi, Tex.	40
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Fuennig, Paul, Geophoto Services, Inc., 305 E. & C. Bldg., Denver, Colo.	47
Fulghum, Henry Leroy, Pure Oil Co., Box 239, Houston, Tex.	46
Fulk, Frank Floyd, Box 1126, Fort Stockton, Tex.	43
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Fuller, Oscar Kenneth, Jr., United Geophysical Co., Pasadena, Calif.	47
Fulmer, Edward Andrew Martin, Calif. Standard Co., Princess, Alta., Canada.	46
Fulton, Loris J., Pure Oil Co., Box 1308, Billings, Mont.	20
Funk, Fred J., The Ohio Oil Co., Findlay, Ohio.	28
Funkhouser, E. M., Woodley Petr. Co., Box 1872, Abilene, Tex.	36
Funkhouser, Harold John, Mene Grande Oil Co., Apt. 709, Caracas, Venezuela, S. A.	39
Fuqua, H. B., Gulf Oil Corp., Box 2100, Houston, Tex.	20
Fuqua, Marjorie Charline, 505 Bolivar St., Bellaire, Tex.	40
Fusselman, Joseph Landrey, The Texas Co., Box 1051, Cody, Wyo.	47
Futral, John Edward, The Texas Co., Box 2332, Houston, Tex.	44
Fyfe, Douglas, Cia. Pemana de Petroleo "El Oriente," Apt. 1051, Lima, Peru, S. A.	20
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Gaby, Phillip Pritchett, Standard Oil Co. of Calif., 1129 Standard Oil Bldg., San Francisco, Calif.	43
Gaddess, Gene, Pure Oil Co., Olney, Ill.	43
Gaddess, Jack, North Pennsylvania Gas Co., Port Allegany, Pa.	25
Gaenslen, George, Standard Oil Co. of Egypt, Bag 1, Cairo, Egypt.	38
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Gahagan, Donald I., Pan-American Prod. Co., 1245 Mellie Esperson Bldg., Houston, Tex.	39
Gahring, William Ross, Ross Oil Co., Box 520, Shawnee, Okla.	25
Gaige, Gerald Robert, Magnolia Petr. Co., Box 535, Mt. Vernon, Ill.	46
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Gale, Arthur Sullivan, Jr., Pan-American Prod. Co., 1247 Mellie Esperson Bldg., Houston, Tex.	39
Gale, Hoyt Rodney, Univ. of Southern California, Los Angeles, Calif.	29
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Gallie, John Francis, Cabot Carbon Co., Box 1101, Pampa, Tex.	41

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Galloway, Jesse J., Univ. of Indiana, Bloomington, Ind.	25
Galloway, John O., The Calif. Standard Co., 700 Lancaster Bldg., Calgary, Alta., Canada	21
Gallup, W. B., Imperial Oil Co., Turner Valley, Alta., Canada	43
Galpin, Sidney L., Agr. Exp. Sta., West Virginia Univ., Morgantown, W. Va.	19
Galpin, Sidney Stewart, Peoples Natural Gas Co., 545 William Penn Way, Pittsburgh, Pa.	42
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Gantt, Fulton Shirley, Gulf Oil Corp., Bellaire, Tex.	48
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Gardner, A. Maclay, Lane-Wells Co., Hollywood, Calif.	30
Gardner, Dion Lowell, Orange County Water Dist., 222 Santa Ana Community Center, Santa Ana, Calif.	46
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Gardner, Frank Johnson, Rinehart Oil News Co., Box 1702, Houston, Tex.	40
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Gardner, Julia, U. S. Geol. Survey, Washington, D. C.	27
Gardner, Louis S., U. S. Geol. Survey, Washington, D. C.	45
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Garner, Aubrey H., Conselho Nacional do Petroleo, Av. Presidente Wilson, No. 164-90, Rio de Janeiro, Brazil, S. A.	19
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Garrett, Julius Benjamin, Jr., Stanolind Oil & Gas Co., Box 3002, Houston, Tex.	35
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Gester, Peter Warren, Richmond Explor. Co., Apt. 93, Maracaibo, Venezuela, S. A.	45
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Gibson, Eugene Ashley, Humble Oil & Refg. Co., New Orleans, La.	44
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Gilbert, Charles Merwin, Univ. of California, Berkeley, Calif.	47
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Gilbert, Orrin Wilfred, Standard Oil Co. of Calif., Los Angeles, Calif.	46
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Gillin, John A., Natl. Geophysical Co., Dallas, Tex.	43
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Gillson, Joseph L., E. I. du Pont de Nemours & Co., Rm. 8060, Du Pont Bldg., Wilmington, Del.	30
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Given, Robert Jennings, Phillips Petr. Co., Bartlesville, Okla.	39
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Gleddie, Joseph, Imperial Oil, Ltd., Calgary, Alta., Canada.	40
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Goodman, Clark, Massachusetts Inst. of Tech., Cambridge, Mass.	43
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Goodrich, Raymond H., consulting, 2901 Gulf Bldg., Houston, Tex.	24
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Gorman, Joseph Michael, Creole Petr. Corp., Apt. 889, Caracas, Venezuela, S. A.	44
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Graser, Frederick Arthur, Mining Bldg., Missouri School of Mines, Rolla, Mo.	45
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Griffin, Judson Roy, Western College, Bowling Green, Ky.....	44
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Griffith, Cunningham LeRoy, Alleyton, Tex.....	22
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Hagan, Wallace Woodrow, Sohio Petr. Co., Box 512, Owensboro, Ky.	38
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Hagen, Cecil Vernon, consulting, 1518 Gulf Bldg., Houston, Tex.	31
Hager, Dilworth S., independent, 932 Liberty Bank Bldg., Dallas, Tex.	22
Hager, Dorsey, consulting, Box 374, Centralia, Ill.	19
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Haight, Harold W., Creole Petr. Corp., Apt. 889, Caracas, Venezuela, S. A.	27
Haines, Richard Bower, Continental Oil Co., Bakersfield, Calif.	38
Hairgrove, Marvin Ellis, Humble Oil & Refg. Co., Columbia, Miss.	47
Hake, Benjamin F., Gulf Oil Corp., 17 Battery Pl., New York, N. Y.	26
Hakes, Willard Renick, c/o M. M. Daughtry, Rt. 1, Stamford, Tex.	40
Halbouty, Michel Thomas, consulting, Shell Bldg., Houston, Tex.	31
Halbouty, James Jubron, Standard Oil Co. of Tex., Box 1249, Houston, Tex.	42
Hale, Francis Ayers, Richmond Explor. Co., Apt. 868, Caracas, Venezuela, S. A.	46
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Hall, Ellis A., Condor Petr. Co., Albuquerque, N. Mex.	25
Hall, Elwin B., E. B. Hall & Co., 523 W. Sixth St., Los Angeles, Calif.	24
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Halsted, Morris E., Amerada Petr. Corp., 1811 Esperson Bldg., Houston, Tex.	30
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Ham, William Eugene, Oklahoma Geol. Survey, Norman, Okla.	42
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Hamilton, Charles W., Gulf Oil Corp., 16th Fl., 17 Battery Pl., New York, N. Y.	20
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Hamilton, Edward Alricks, The Calif. Co., 1006 U. S. Natl. Bank Bldg., Denver, Colo.	41
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Hamilton, Irving Boyd, Sun Oil Co., Odessa, Tex.	40
Hamilton, James Raymond, La Gloria Corp., Corpus Christi, Tex.	40
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Hamner, Francis Merrick, Stanolind Oil & Gas Co., Lake Charles, La.	42
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Hannon, Norbert Michael, Jr., Phillips Petr. Co., Box 285, Anadarko, Okla.....	48
Hannum, Connelly Edgar, The Texas Co., Box 539, Ardmore, Okla.....	43
Hannum, Robert Charles, c/o Ray Fox, Cedarville, Mich.....	44
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Harder, Robert P., The Superior Oil Co., 510 K. F. H. Bldg., Wichita, Kan.....	43
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Hardison, George Porter, Schweer & Hardison, Wichita Falls, Tex.....	32
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Heathman, Walter W., Union Oil Co. of Calif., Olympia, Wash.	36
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Helmig, Phillips Dobbs, Jr., Canadian Gulf Oil Co., Calgary, Alta., Canada	37
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Henderson, John Blythe Halton, Survey Drig. Co., Box 324, Dallas, Tex.	46
Henderson, John William, Natl. Assoc. Petr. Co., Mt. Vernon, Ill.	47
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Henker, Warren Max, Tropical Oil Co., Bogota, Colombia, S. A.	47
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Holcomb, Leroy Delville, Union Oil Co. of Calif., Olympia, Wash.	48
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Lester, O. C., Jr., Rt. 1, Box 326, Aurora, Ore.	29
Levet, Melvin N., Lane-Wells Co., Monterey Park, Calif.	47
Levings, William Stephen, Colorado School of Mines, Golden, Colo.	23
Levorsen, A. Irving, Stanford Univ., Stanford University, Calif.	19
Levorsen, Robert Irving, The Calif. Co., Box 202, Brookhaven, Miss.	46
Lewark, James Edward, Carter Oil Co., Fort Smith, Ark.	41
Lewis, Frank E., Cooperative Refinery Assn., 402 Schweiter Bldg., Wichita, Kan.	21
Lewis, George Russell, Venezuelan Atlantic Refg. Co., Apt. 893, Caracas, Venezuela, S. A.	47
Lewis, J. Whitney, Apt. 744, Trujillo City, Dominican Republic	23
Lewis, James Albert, James A. Lewis Engineering Co., 6923 Snider Plaza, Dallas, Tex.	38
Lewis, James O., consulting, 1912 Commerce Bldg., Houston, Tex.	19
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Lewis, Jerry Burton, The Ohio Oil Co., Tulsa, Okla.	44
Lewis, John Porter, Sohio Petr. Co., Mt. Pleasant, Mich.	45
Lewis, Kenneth W., W. C. McBride, Inc., Evansville, Ind.	45
Lewis, Lloyd Alan, Explor. Dept., Shell Oil Co., Inc., Box 601, Ventura, Calif.	42
Lewis, Milton W., consulting, Petr. Bldg., Los Angeles, Calif.	37
Lewis, Paul S., Humble Oil & Refg. Co., Hattiesburg, Miss.	30
Lewis, Ray C., Houston Oil Co. of Tex., Box 2412, Houston, Tex.	36
Lewis, Wendell L., Houston Oil Co. of Tex., Box 2412, Houston, Tex.	42
Lewis, William Dabney, General Petr. Corp., 108 W. Second St., Los Angeles, Calif.	40
Ley, Henry A., Rio Oil Corp., Fort Worth, Tex.	19
Ley, Ross Henry, Sun Oil Co., Box 2880, Dallas, Tex.	45
Leyds, Louis W., Asiatic Petr. Co., St. Helens Ct., Great St. Helens, London, E. C. 3, England.	27
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Lillibridge, Frederick Stead, Sunray Oil Corp., Wichita, Kan.	41
Lillibridge, Harry E., consulting, 1207 Ramona Dr., Enid, Okla.	28
Lilligren, Jonathan Martin, Sinclair Prairie Oil Co., Box 4138, Bellevue, Pittsburgh, Pa.	21
Lilly, Otis J., Byrd-Frost, Inc., Box 911, Durango, Colo.	48
Liming, John A., Carter Oil Co., Purcell, Okla.	40
Lincoln, William Wilkinson, Big West Drlg. Co., 722 Ardis Bldg., Shreveport, La.	28
Lind, Charles McClelland, Humble Oil & Refg. Co., Alice, Tex.	45
Lindberg, George David, Sun Oil Co., Toledo, Ohio.	38
Lindeblad, E. E., Continental Oil Co., Box 431, Midland, Tex.	19
Lindeblad, Ludvig C., Stanolind Oil & Gas Co., Box 1540, Midland, Tex.	44
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Lindsay, Robert English, Tide Water Assoc. Oil Co., Box 1708, Casper, Wyo.	36
Lindsay, Sidney Afton, Skelly Oil Co., Houston, Tex.	42
Lindsly, Ben E., Securities & Exchange Comm., Falls Church, Va.	37
Linehan, Charles M., The Superior Oil Co., Midland, Tex.	47
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Link, Theodore A., Imperial Oil Co., Ltd., 56 Church St., Toronto, Ont., Canada.	21
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Lloyd, Joel Joseph, Socony-Vacuum Oil Co., Apt. Aereo 4034, Bogota, Colombia, S. A.	46
Lock, John Henry, Sinclair Petr. Co., Addis Ababa, Ethiopia.	38
Lockett, George L., Mene Grande Oil Co., C. A., Apt. 709, Caracas, Venezuela, S. A.	35
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Lockwood, Robinson P., Gulf Oil Corp., 507 Lancaster Bldg., Calgary, Alta., Canada.	30
Loeblich, Alfred Richard, Jr., U. S. Natl. Museum, Washington, D. C.	42
Loeffler, Richard John, Standard Oil Co. of Venezuela, Caripito, Venezuela, S. A.	40
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Loetterle, Gerald John, Hudnall & Pirtle, Tyler, Tex.	33
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Long, Walter Edwards, Geier-Jackson, Inc., 2107 Jarrel Ave., Tyler, Tex.	46
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Lyons, Richard T., Tide Water Assoc. Oil Co., Box 1404, Houston, Tex.	22
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MacAlpin, Archie Justus, Univ. of Notre Dame, Notre Dame, Ind.	45
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MacDonell, James A., Highlands Oil Co., Lima, Ohio	25
MacGregory, James Donald, International Petr. Co., Talara, Peru, S. A.	42
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Mahoney, John Francis, 709 Kirby St., Lake Charles, La.	36
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Maley, Willis A., Humble Oil & Refg. Co., Box 1271, Corpus Christi, Tex.	29
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Mallory, Robert William, Stanolind Oil & Gas Co., Box 2089, Amarillo, Tex.	40
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Marino-Proby, Mario Rafael, Univ. of Chile, Santiago de Chile, S. A.	46
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Markley, Elmer A., Barnsdall Oil Co., Tulsa, Okla.	23
Markley, Joseph H., Jr., The Texas Co., Box 1720, Fort Worth, Tex.	28
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Marshall, Jesse William, Pure Oil Co., Box 1753, Billings, Mont.	42
Marshall, John, The Texas Co., Box 2100, Denver, Colo.	38
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Marshall, Walter Hill, Union Prod. Co., Box 1407, Shreveport, La.	40
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Martens, Willis Pershing, independent, Box 552, Newcastle, Wyo.	45
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Martin, Benjamin Herbert, Pan-American Prod. Co., Abilene, Tex.	41
Martin, Bethea Allen, Creole Petr. Corp., Apt. 889, Caracas, Venezuela, S. A.	41
Martin, Francis I., Socony-Vacuum Oil Co., C. A., Apt. 246, Caracas, Venezuela, S. A.	23
Martin, Helen M., Dept. of Conservation, Michigan Geol. Survey, State Office Bldg., Lansing, Mich.	25
Martin, Jack, General Geophysical Co., Houston, Tex.	44
Martin, James Littell, Jr., Sinclair Prairie Oil Co., Box 776, Tallahassee, Fla.	40
Martin, John Charles, Jr., Texas Gulf Prod. Co., Box 2109, Houston, Tex.	39
Martin, Joseph Stewart, Tidewater Assoc. Oil Co., 308 Hopkins Bldg., Bakersfield, Calif.	48
Martin, Lois T., Shell Oil Co., Inc., Box 999, Bakersfield, Calif.	41
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Maxwell, Ross Allen, Big Bend Natl. Park, Marathon, Tex.....	30
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[[McCall, Charles Louis, Texas Pacific Coal & Oil Co., Shreveport, La.....	43
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McCarver, Alfred Gerald, Forest Oil Corp., Jackson, Miss.	41
McCarver, Holland C., Seaboard Oil Co., Continental Bldg., Dallas, Tex.	41
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McClure, Joseph Hugh, consulting, R.F.D. #1, Box 215, Midland, Tex.	31
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McCullough, Joe Jackson, Union Oil Co. of Calif., 1804 Spring St., Paso Robles, Calif.	44
McCullough, Russell L., Cities Service Oil Co., Box 306, Great Bend, Kan.	25
McDaniel, Fred, Sunray Oil Corp., Box 195, Great Bend, Kan.	39
McDermott, Eugene, Geophysical Service, Inc., Box 7045, Dallas, Tex.	29
McDonald, Joseph Wilson, Shell Oil Co., Inc., Box 2010, Wichita Falls, Tex.	47
McDonald, Stanley Matthews, Louisiana Land & Explor. Co., 1904 American Bank Bldg., New Orleans, La.	44
McDonald, Worth W., Taylor Refg. Co., San Antonio, Tex.	24
McDonnold, Haydon W., Keystone Explor. Co., 2813 Westheimer Rd., Houston, Tex.	36
McDonw, Edward L., Shell Oil Co., Inc., 1008 W. Sixth St., Los Angeles, Calif.	45
McDowell, Alfred Norman, 2106 Laurel St., Texarkana, Ark.	43
McEachin, Wright Daniel, Sinclair Prairie Oil Co., Box 1470, Midland, Tex.	38
McFadden, William A., Jr., Standard Oil Co. of Tex., Box 1249, Houston, Tex.	38
McFall, Rex Lewis, Pan-American Prod. Co., Box 1618, Abilene, Tex.	45
McFarlan, Arthur Crane, Univ. of Kentucky, Lexington, Ky.	38

McFarlan, Edward, Jr., 1915 Nueces St., Austin, Tex.	47
McFarland, Earl R., consulting, 2825 S. First, Abilene, Tex.	30
McFarland, L. R., Magnolia Petr. Co., Box 3671, West Jackson, Miss.	33
McFarland, Paul W., Sun Oil Co., Box 2880, Dallas, Tex.	23
McFarland, Russell S., Seaboard Oil Co., 1400 Continental Bldg., Dallas, Tex.	18
McFerron, George I., Sohio Petr. Co., 620 Esperson Bldg., Houston, Tex.	22
McGaha, Charles P., Fain-McGaha Oil Corp., 607 Hamilton Bldg., Wichita Falls, Tex.	29
McGee, D. A., Kerr-McGee Oil Industries, Inc., Kerr-McGee Bldg., Oklahoma City, Okla.	20
McGee, John Evan, Gulf Research & Devel. Co., Box 2100, Houston, Tex.	43
McGhee, J. Rex, Shell Oil Co., Inc., Box 1191, Tulsa, Okla.	30
McGhee, George Crews, Economic Affairs, Dept. of State, Washington, D. C.	31
McGill, Andrew K., Socony-Vacuum Oil Co., Casilla 2887, Lima, Peru, S. A.	45
McGill, William M., Virginia Geol. Survey, Box 1428, Univ. Sta., Charlottesville, Va.	26
McGinty, James, Iraq Petr. Co., Ltd., Box 1, Kirkuk, Iraq	46
McGirt, James N., Tide Water Assoc. Oil Co., Thompson Bldg., Tulsa, Okla.	25
McGlamery, Winnie, Alabama Geol. Survey, University, Ala.	46
McGlothlin, Tom, Gulf Refg. Co., Laurel, Miss.	29
McGovey, Paul E., Honolulu Oil Corp., 410 Professional Bldg., Bakersfield, Calif.	39
McGowan, F. H., Humble Oil & Refg. Co., Box 2180, Houston, Tex.	29
McGrath, Patrick Bernard, Richmond Explor. Co., Apt. 92, Maracaibo, Venezuela, S. A.	47
McGregor, Duncan Junior, 922 Kentucky St., Lawrence, Kan.	47
McGrew, Harry Johnson, Gulf Research & Devel. Co., Box 2038, Pittsburgh, Pa.	43
McGuckin, Glenn Merle, Reliable Geophysical Co., Corpus Christi, Tex.	46
McGuigan, Francis Henry, Lion Oil Co., Butler Bldg., Midland, Tex.	38
McGuirt, James H., Tide Water Assoc. Oil Co., Esperson Bldg., Houston, Tex.	36
McHugh, James W., The Texas Co., Box 2420, Tulsa, Okla.	40
McHugh, William Ernest, Phillips Petr. Co., 610 Petr. Bldg., Wichita, Kan.	35
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McKay, Alexander Ewing, Geophysical Dept., The Atlantic Refg. Co., Box 2810, Dallas, Tex.	30
McKee, Alexander Heberton, Danish-American Prospecting Co., Asanigaarden, Viborg, Denmark	45
McKee, Edwin D., Univ. of Arizona, Tucson, Ariz.	41
McKee, H. Harper, Brokaw, Dixon & McKee, Rm. 1457, 120 Broadway, New York, N. Y.	17
McKee, Lynne C., The Ohio Oil Co., Box 933, Tallahassee, Fla.	46
McKeever, John Herbert, Jr., Calif. Standard Co., 700 Lancaster Bldg., Calgary, Alta., Canada	47
McKinlay, Ralph Harold, Magnolia Petr. Co., Wichita Falls, Tex.	44
McKinley, Glenn Ernest, Classen High School, Oklahoma City, Okla.	45
McKinnon, Frederick Allan, Imperial Oil Co., Ltd., Calgary, Alta., Canada	43
McKinsey, Mark Howard, Shell Oil Co., Inc., Box 1509, Midland, Tex.	40
McKittrick, William Ernest, Shell Oil Co., Inc., Box 1557, Sacramento, Calif.	45
McKnight, C. R., Land & Tax Dept., Colorado Fuel & Iron Corp., Box 1920, Denver, Colo.	25
McLaren, Robert L., Texas Seismograph Co., Wichita Falls, Tex.	27
McLaughlin, Kenneth Phelps, State College of Washington, Pullman, Wash.	44
McLaughlin, Thad G., U. S. Geol. Survey, 136 New Customhouse, Denver, Colo.	43
McLay, James Harold, Venezuelan Atlantic Refg. Co., Apt. 803, Caracas, Venezuela, S. A.	48
McLean, James Douglas, Jr., independent, 4 Summit Pl., Belle Haven, Alexandria, Va.	46
McLellan, Hiram J., Humble Oil & Refg. Co., Box 2180, Houston, Tex.	20
McLendon, Dan Harvey, Lane-Wells Co., Box 961, Lake Charles, La.	41
McLennan, Lamar, Jr., Seaboard Oil Co. of Del., Box 152, Midland, Tex.	44
McLeod, Angus, consulting, Apt. 412, Maple Terr., Dallas, Tex.	10
McMahan, Walter W., Jr., Box 2539, College Station, Tex.	47
McMahon, Beverly Edith, Shell Oil Co., Inc., Box 2010, Wichita Falls, Tex.	45
McMahon, Joe Trees, Benedum-Trees Oil Co., Shreveport, La.	43
McManamy, John Lyle, consulting, 1922 Richview Rd., Mt. Vernon, Ill.	46
McMasters, John Herbert, Honolulu Oil Corp., 410 Professional Bldg., Bakersfield, Calif.	42
McMillan, John Robertson, Fullerton Oil Co., 944 Wilshire Blvd., Los Angeles, Calif.	38
McMillan, Robert, Geophoto Services, Inc., 305 E. & C. Bldg., Denver, Colo.	42
McMillen, Ralph Eugene, Phillips Venezuelan Oil Co., Apt. 1031, Caracas, Venezuela, S. A.	47
McMillen, Raymond F., Alkay Oil Co., 920 Kennedy Bldg., Tulsa, Okla.	27
McMorris, William Albert, Jr., Carter Oil Co., Box 801, Tulsa, Okla.	41
McMullen, Donald John, East Bay Municipal Utilities Dist., Oakland, Calif.	45
McMurtry, Wilbur Earl, Magnolia Petr. Co., Box 1828, Oklahoma City, Okla.	41
McNab, James, American Bitumuls Co., 200 Bush St., San Francisco, Calif.	37
McNally, Perry Michael, Seismograph Crew, Phillips Petr. Co., Anadarko, Okla.	43
McNaughton, Duncan Anderson, Univ. of Southern California, Los Angeles, Calif.	41

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McNeely, Robert B., consulting, 209 Petr. Bldg., Wichita, Kan.	25
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McNulty, Charles Lee, Jr., North Texas Agric. College, Arlington, Tex.	46
McNutt, Gordon Russell, 908 W. Comanche, Norman, Okla.	42
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McRae, Asa Duncan, Magnolia Petr. Co., Box 872, Lake Charles, La.	46
McRae, Walter Thomas, Jr., Texas Pacific Coal & Oil Co., Box 393, Midland, Tex.	47
McReynolds, Gregg F., Humble Oil & Refg. Co., 254-C Humble Bldg., Houston, Tex.	36
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Mead, Roy G., Mohawk Petr. Corp., Bakersfield, Calif.	31
Mead, Roy Gibbons, Jr., 4718 Lexington Ave., Los Angeles, Calif.	39
Meagher, David Pope, Carter Oil Co., Box 1490, Jackson, Miss.	41
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Meents, Wayne Franklin, Illinois Geol. Survey, Urbana, Ill.	44
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Melsheimer, Albert Harry, Union Sulphur Co., Inc., San Antonio, Tex.	41
Melton, Frank Armon, Univ. of Oklahoma, Norman, Okla.	42
Meltzer, Lee Hillard, Union Prod. Co., Box 1407, Shreveport, La.	37
Melvin, John Harper, Orton Hall, Ohio State Univ., Columbus, Ohio.	43
Melvin, Marlowe Douglas, Carter Oil Co., Box 568, Mattoon, Ill.	39
Melzer, Laurence S., Stanolind Oil & Gas Co., Box 660, Tyler, Tex.	41
Mencher, Ely, Socony-Vacuum Oil Co. of Venezuela, Apt. 246, Caracas, Venezuela, S. A.	45
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Menefee, James C., Magnolia Petr. Co., Box 900, Dallas, Tex.	36
Menger, Hubert Emil, Shield Oil Co., 1442 Milam Bldg., San Antonio, Tex.	36
Menish, Jack Angus, Stanolind Oil & Gas Co., Box 1540, Midland, Tex.	47
Menken, Fred A., Assoc. Div., Tide Water Assoc. Oil Co., San Francisco, Calif.	32
Mercer, Leonard Arthur, Sinclair Wyoming Oil Co., Box 1809, Casper, Wyo.	46
Mercier, Vincent James, Lane-Wells Co., 906 Central Bldg., Wichita, Kan.	47
Meredith, Carlton, consulting, Kirby Bldg., Dallas, Tex.	20
Meredith, Helen June King, Gen. Del., San Diego, Calif.	45
Merk, Ernest Edward, Jr., Gulf Oil Corp., Box 1290, Fort Worth, Tex.	45
Merrill, William Raymond, Richmond Explor. Co., Apt. 868, Caracas, Venezuela, S. A.	42
Merritt, Floyd C., Byron-Jackson Co., Vernon, Calif.	23
Merritt, John W., consulting, 1324 E. Seventeenth Pl., Tulsa, Okla.	18
Merritt, Roy W., Socony-Vacuum Oil Co., Apt. Nacl. 1140, Bogota, Colombia, S. A.	29
Merry, Edward T., Merry Bros., Spring Hill, Ala.	25
Mershon, Milton M., Fort Smith Gas Co., Tulsa, Okla.	25
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Mestier, Arthur Joseph, Jr., Allis-Chalmers Mfg. Co., West Allis, Wis.	44
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Metcalf, Myron C., Wood River Oil & Refg. Co., Oklahoma City, Okla.	30
Mettner, Francis Edwin, The Texas Co., Box 2332, Houston, Tex.	38
Metts, Dean Francis, Humble Oil & Refg. Co., Box 1271, Corpus Christi, Tex.	34
Metz, Milam Sutton, Shell Oil Co., Inc., Box 1509, Midland, Tex.	44
Metzner, Loyde Henry, Signal Oil & Gas Co., Box 5840, Metropolitan Sta., Los Angeles, Calif.	41
Meyer, Arthur M., The Atlantic Refg. Co., Box 169, Shawnee, Okla.	21
Meyer, John Carl, Jr., Barnsdall Oil Co., Box 873, Midland, Tex.	47
Meyer, Marvin Phillip, Illinois Geol. Survey, Urbana, Ill.	47
Meyer, Robert Frederick, Kerr-McGee Oil Industries, Inc., Box 243, Midland, Tex.	39
Meyer, Ruskin H., MacMillan Petr. Corp., Box 411, El Dorado, Ark.	42
Meyer, Willis G., Meyer & Achtschin, 502 Continental Bldg., Dallas, Tex.	37
Meyerhoff, Howard Augustus, Smith College, Northampton, Mass.	46
Meyers, Percy A., c/o Claud B. Hamill, 1118 City Natl. Bank Bldg., Houston, Tex.	25
Michael, James F., consulting, 332 Sewanee Dr., Jackson, Miss.	38

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Miles, Daniel John, 1134 Delia Ave., Akron, Ohio.	47
Miles, Phil Middleton, independent, 122 McDowell Rd., Lexington, Ky.	41
Miley, Roy Allen, Texas Petr. Co., Apt. 877, Bogota, Colombia, S. A.	42
Milford, Norman J., North American Oil Consolidated, Box E, Taft, Calif.	47
Millard, William J., consulting, 32 W. Fortieth St., New York, N. Y.	17
Miller, Albert Douglas, independent, 10 Levy Bldg., Lafayette, La.	30
Miller, Arthur K., Univ. of Iowa, Iowa City, Iowa.	39
Miller, Buford, Benedum & Trees, 2305 Esperson Bldg., Houston, Tex.	42
Miller, Buford Maxwell, The Texas Co., Box 2420, Tulsa, Okla.	36
Miller, Carroll C., Renwar Oil Corp., 1801 Driscoll Bldg., Corpus Christi, Tex.	25
Miller, Charles Parmer, consulting, Box 385, Hobbs, N. Mex.	35
Miller, David B., consulting, 1336 Gaylord St., Denver, Colo.	29
Miller, David M., Union Prod. Co., Box 711, Beeville, Tex.	37
Miller, E. Floyd, c/o A. G. Oliphant, 1905 Natl. Bank of Tulsa Bldg., Tulsa, Okla.	24
Miller, Floyd Henry, Jr., Gulf Oil Corp., Box 110, Amarillo, Tex.	48
Miller, Forrest J., Arkansas Fuel Oil & Refg. Co., Box 283, Houston, Tex.	22
Miller, Guy E., Shell Oil Co., Inc., 2080 Obispo Ave., Long Beach, Calif.	25
Miller, Harry A., independent, 311 E. Fourth St., Edmond, Okla.	28
Miller, Harry August, Jr., The Ohio Oil Co., Box 552, Midland, Tex.	46
Miller, Howard L., Cities Service Oil Co., 1440 Mellie Esperson Bldg., Houston, Tex.	46
Miller, J. Charles, U. S. Geol. Survey, 533 U. S. Post Office & Court House Bldg., Los Angeles, Calif.	19
Miller, John Bakken, Richmond Explor. Co., Sociedad a Camejo 16, Caracas, Venezuela, S.A.	41
Miller, John C., Jergins Oil Co., 1323 City Natl. Bank Bldg., Houston, Tex.	28
Miller, John Robson, Stanolind Oil & Gas Co., Box 40, Casper, Wyo.	42
Miller, Lloyd C., Signal Oil & Gas Co., Los Angeles, Calif.	47
Miller, Lloyd Eugene, Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.	41
Miller, Milward, Humble Oil & Refg. Co., Midland, Tex.	33
Miller, Norman Clark, Arkansas Natural Gas Corp., Shreveport, La.	47
Miller, Powell Wesley, c/o V. C. Perini, Box 840, Abilene, Tex.	40
Miller, Ralph LeRoy, U. S. Geol. Survey, Washington, D. C.	44
Miller, Robert DuWayne, Shell Oil Co., Inc., Box 2099, Houston, Tex.	46
Miller, Robert H., Miller Geophysical Co., 1044 S. Robertson Blvd., Los Angeles, Calif.	37
Miller, Robert P., Richmond Petr. Co. of Calif., Rm. 1229, 225 Bush St., San Francisco, Calif.	28
Miller, Victor Charles, Sinclair Wyoming Oil Co., 415 Continental Bldg., Denver, Colo.	48
Miller, Vincent, Explor. Service Co., Box 1289, Bartlesville, Okla.	39
Miller, Wendell Z., consulting, 104 E. Twenty-sixth Pl., Tulsa, Okla.	21
Miller, Willard L., Ramsey Petr. Corp., Oklahoma City, Okla.	19
Miller, William Clubine, U. S. Engineers, Huntington, W. Va.	31
Miller, William Dana, Rm. 2704, 120 Broadway, New York, N. Y.	31
Miller, William Rinehart, Humble Oil & Refg. Co., Box 672, Kingsville, Tex.	46
Millhauser, James Dewitt, The Ohio Oil Co., Bakersfield, Calif.	46
Millikan, Charles V., Amerada Petr. Corp., Box 2040, Tulsa, Okla.	20
Millison, Clark, consulting, 1605 Philtower Bldg., Tulsa, Okla.	27
Mills, Coe S., The Ohio Oil Co., Box 552, Midland, Tex.	27
Mills, Lloyd Clarence, Southland Royalty Co., Box 773, Midland, Tex.	39
Mills, R. van A., 130 Whitworth Ave., Ponca City, Okla.	21
Mills, Robert Greenleaf, United Geophysical Co., Cotulla, Tex.	47
Mills, Ruben C., Jr., Standard Oil Co. of Tex., Box 1602, Corpus Christi, Tex.	42
Millward, Louis George, Socony-Vacuum Oil Co., Ltd., 62 Sharia Ibrahim Pasha, Cairo, Egypt.	45
Milner, Charles A., Jr., c/o C. W. Tomlinson, Ardmore, Okla.	25
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Minahan, James Leo, U. S. Geol. Survey, Box 789, Holdenville, Okla.	46
Minard, David Lee, Stanolind Oil & Gas Co., Box 1518, Lake Charles, La.	48
Ming, Raymond E., Stanolind Oil & Gas Co., Box 3092, Houston, Tex.	42
Minor, H. E., Gulf Oil Corp., Box 2100, Houston, Tex.	18

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Minton, Joseph Weber, Sun Oil Co., Corpus Christi, Tex.	36
Minton, Morris Creswell, Standard Oil Co. of Tex., 1604 Milam Bldg., San Antonio, Tex.	45
Minton, Robert Joseph, Wasatch Oil Refg. Co., Salt Lake City, Utah.	41
Miranda-Ruiz, Leandro, Creole Petr. Corp., Apt. 880, Caracas, Venezuela, S. A.	47
Miser, Hugh D., U. S. Geol. Survey, Washington, D. C.	23
Mitchell, George Dampier, Jr., Advanced Explor. Co., 622 First Natl. Bank Bldg., Houston, Tex.	34
Mitchell, Harold DeLong, independent, 525 W. Prospect St., Seattle, Wash.	38
Mitchell, James G., Pure Oil Co., Box 811, Durango, Colo.	41
Mitchell, Mark William, Bates & Cornell, Box 1000, Lafayette, La.	41
Mitchell, Robert B., The R. B. Mitchell Co., 2218 City Natl. Bank Bldg., Houston, Tex.	29
Mitchell, Robert Oliphant, Stanolind Oil & Gas Co., Box 1654, Oklahoma City, Okla.	42
Mix, Adrian Elroy, Halliburton Oil Well Cementing Co., Shreveport, La.	42
Mix, Charles A., Standard Oil Co. of Tex., 506 Blackstone Bldg., Tyler, Tex.	26
Mix, Sidney E., consulting, 902 Unadilla St., Shreveport, La.	22
Moffatt, Robert J., Carter Oil Co., Box 1739, Shreveport, La.	46
Mohler, Charles Edwin, Natl. Assoc. Petr. Co., 502 Ritz Bldg., Tulsa, Okla.	39
Mohler, Donald Phillips, Humble Oil & Refg. Co., Hamilton Bldg., Wichita Falls, Tex.	39
Mohr, Clifford L., Hoover, Curtice & Ruby, Rm. 400, 620 Fifth Ave., New York, N. Y.	25
Moir, Leo Hughes, Jr., Wilshire Oil Co., Inc., 944 Main St., Santa Paula, Calif.	44
Monaghan, Richard Joseph, Phillips Venezuelan Oil Co., Apt. 19, Barcelona, Venezuela, S. A.	43
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Monahan, Foster Murray, Ashland Oil & Refg. Co., 308 Natl. Bank of Tulsa Bldg., Tulsa, Okla.	42
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Monnett, Victor Brown, Oklahoma A. & M. College, Stillwater, Okla.	47
Monnett, V. Elvert, Univ. of Oklahoma, Norman, Okla.	19
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Monsour, Edward, U. S. Engineers, Mississippi River Comm., Louisiana State Univ., Baton Rouge, La.	41
Monsour, Eli T., consulting, Box 2571, West Jackson, Miss.	30
Monsour, Emil, Sun Oil Co., 832 Milam Bldg., San Antonio, Tex.	36
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Montgomery, Don D., consulting, Box 747, El Dorado, Ark.	38
Montgomery, James Campbell, Harrison Oil Co., Gulf Bldg., Houston, Tex.	37
Montgomery, Phil C., Halliburton Oil Well Cementing Co., Duncan, Okla.	31
Montgomery, Porter A., Jr., Stanolind Oil & Gas Co., Box 341, Sweetwater, Tex.	44
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Moody, John Drummond, Kuwait Oil Co., Ltd., Kuwait, Persian Gulf.	40
Moody, Ray R., Gulf Oil Corp., 1107 Union Natl. Bank Bldg., Wichita, Kan.	27
Moore, Barton Walker, independent, 2005 S. Robertson, Tyler, Tex.	31
Moore, Bernard Nettleton, Consolidada de Petroleo, Apt. 1706, Caracas, Venezuela, S. A.	41
Moore, Carl Allphin, Univ. of Oklahoma, Norman, Okla.	39
Moore, Charles L., U. S. Bureau of Mines, Dept. of the Interior, Washington, D. C.	45
Moore, David A., The Superior Oil Co., 313 Sill Bldg., Bakersfield, Calif.	43
Moore, Edward Lionel, Casilla 2887, Lima, Peru, S. A.	44
Moore, Fred Holmsley, Magnolia Petr. Co., Box 493, Roswell, N. Mex.	37
Moore, Gilbert Parvin, consulting, 501 Continental Bldg., Dallas, Tex.	24
Moore, Homer Clarence, Oil Explor., Inc., McBirney Bldg., Tulsa, Okla.	40
Moore, Horatio L., J. E. Crosbie, Inc., 1810 Natl. Bank of Tulsa Bldg., Tulsa, Okla.	42
Moore, James A., Union Sulphur Co., Sulphur, La.	42
Moore, Joe Hiram, Fullerton Oil Co., Box H, Hobbs, N. Mex.	42
Moore, Joe Laurence, Honolulu Oil Corp., Box 1301, Midland, Tex.	43
Moore, John I., independent, Box 753, Midland, Tex.	26
Moore, Kenneth B., 939 Twenty-fifth St., Santa Monica, Calif.	29
Moore, Lee Wayne, Stanolind Oil & Gas Co., Box 1540, Midland, Tex.	41
Moore, Marion Jefferson, Sunray Oil Co., 1610 Milam Bldg., San Antonio, Tex.	39
Moore, Prentiss D., Moore Explor. Co., Midland, Tex.	26
Moore, Raymond C., Univ. of Kansas, Lawrence, Kan.	17
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Moore, William Willard, Jr., The Texas Co., Box 1737, Shreveport, La.	43
Moorhead, Johnny Bob, Continental Oil Co., Box 1800, Wichita Falls, Tex.	41
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Morales, Luis German, Tropical Oil Co., Apt. Nacl. 335, Bogota, Colombia, S. A.	45
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Moran, Thomas Grayson, Special Engineering Div., The Panama Canal, Diablo Heights, C. Z.	44
Moran, William Rodes, Union Oil Co. of Calif., 617 W. Seventh St., Los Angeles, Calif.	44
Morange, Andre Raymond, Regie Autonome des Petroles, St. Gaudens, Hte.-Garonne, France.	47
Mordojovich, Carlos, Corporacion de Fomento, Punta Arenas, Chile, S. A.	47
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Morgan, Cecil L., Dixie Geol. Service, 202 Tower Bldg., Jackson, Miss.	29
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Morgan, D. M., c/o L. H. Wentz, Box 111, Ponca City, Okla.	25
Morgan, Frank A., Richfield Oil Corp., 555 S. Flower St., Los Angeles, Calif.	24
Morgan, Frank Albert, Jr., Stanolind Oil & Gas Co., Box 898, Salt Lake City, Utah.	45
Morgan, George D., Cooper Gas Co., Box 1590, San Angelo, Tex.	22
Morgan, George Oliver, Jr., Humble Oil & Refg. Co., 805-B Humble Bldg., Houston, Tex.	48
Morgan, Henry J., Jr., The Atlantic Refg. Co., Box 2819, Dallas, Tex.	28
Morgan, James Plummer, Louisiana State Univ., Baton Rouge, La.	48
Morgan, John Man, The Superior Oil Co., Oil & Gas Bldg., Houston, Tex.	44
Morgan, L. C., Morgan Acid, Inc., 703 Petr. Bldg., Wichita, Kan.	30
Morgan, Lindsey G., Cities Service Oil Co., 1020 Central Bldg., Wichita, Kan.	30
Morgan, Ray Earland, Dept. of Mining & Geol., West Virginia Inst. of Tech., Montgomery, W. Va.	37
Morgan, Robert Edward, The Atlantic Refg. Co., Box 871, Midland, Tex.	39
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Morningstar, Clyde Franklin, Stanolind Oil & Gas Co., Box 1540, Midland, Tex.	46
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Morris, James David, Derby Oil Co., 422 W. Douglas, Wichita, Kan.	46
Morris, James Howard, Sohio Petr. Co., Box 1667, Shreveport, La.	44
Morris, James Lynn, Pure Oil Co., Box 2107, Fort Worth, Tex.	39
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Selover, Joseph Britton, consulting, Rt. 1, Alvaton, Ky.	42
Semmes, Douglas R., Sarnosa Oil Corp., Milam Bldg., San Antonio, Tex.	19
Senn, Alfred, British Union Oil Co., Ltd., Bridgetown, Barbados, B. W. I.	38
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Senseman, Ralph Burdette, Union Prod. Co., Beeville, Tex.	38
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Shaeffer, Stanley Beaubien, Shell Oil Co., Inc., Petr. Bldg., Midland, Tex.	43
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Sharkey, Henry Howe Robbins, Carter Oil Co., Box 428, Lander, Wyo.	43
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Sheldon, Robert Arnold, Tropical Oil Co., Bogota, Colombia, S. A.	37
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Shoemaker, William Morris, Forest Oil Corp., Bradford, Pa.	43
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Simmons, Harvey Jefferson, Jr., Godfrey L. Cabot, Inc., Box 1473, Charleston, W. Va.	38
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Smith, John Peter, Shell Oil Co., Inc., Weatherford, Tex.	39
Smith, John Peter, Carter Oil Co., Box 309, Carmi, Ill.	38
Smith, Julian W., c/o E. A. Obering, Box 517, Mt. Vernon, Ill.	30
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Smith, Neal Johnstone, The Calif. Co., 1818 Canal Bldg., New Orleans, La.	39
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Valerius, Claude N., Barnsdall Oil Co., 427 Ricou-Brewster Bldg., Shreveport, La.	25
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Van Bellen, Robert Carel, Syrian Petr. Co., Aleppo, Syria.	47
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van Gogh, F. A. A., Zeekant 108 Schev., The Hague, Holland.	21
Van Horn, Richard, U. S. Geol. Survey, Golden, Colo.	47
Van Houten, Franklyn Bosworth, Princeton Univ., Princeton, N. J.	47
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Van Tine, Arthur Benbrook, Colorado School of Mines, Golden, Colo.	41
Van Tuyl, Francis M., Colorado School of Mines, Golden, Colo.	22
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Vaudoit, Paul L., Fifteen Oil Co., 2011 Esperson Bldg., Houston, Tex.	26
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Vernon, I. J., Coweta, Okla.	25
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Vetter, John M., Pan-American Prod. Co., 1245 Mellie Esperson Bldg., Houston, Tex.	24
Vickers, Robert Brice, Jr., Texas Pacific Coal & Oil Co., Breckenridge, Tex.	47
Vickery, Ward R., Vernon Oil & Gas Co., 214 Fourth Natl. Bank Bldg., Wichita, Kan.	28
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Vinklarek, Felix Vendilion, Standard Oil Co. of Tex., Flatonia, Tex.	48
Visser, Willem Anthony, Sarawak Oilfields, Ltd., Seria, State of Brunei (via Singapore), Borneo	48
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Vokes, Harold Ernest, Johns Hopkins Univ., Baltimore, Md.	46
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Volk, Russell H., Plains Explor. Co., Denver, Colo.	42
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Wallace, William Harry, Jr., La Gloria Corp., Corpus Christi, Tex.	47
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Wells, John Cawse, Standard Oil Co. of Calif., Taft, Calif.	42
Wells, Loyal H., Arkansas Fuel Oil Co., Shreveport, La.	47
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Wells, Robert Jackson, Richfield Oil Corp., 560 Haberfelde Bldg., Bakersfield, Calif.	43
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Whitcomb, Bruce, Seaboard Oil Co., Olney, Tex.....	24
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White, Daniel Jefferson, Jr., Salt Dome Oil Corp., Esperson Bldg., Houston, Tex.....	38
White, George Willard, Univ. of Illinois, Urbana, Ill.....	45
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Wible, Everest Elmer, Bell Bros., Robinson, Ill.	47
Widess, Moses B., Stanolind Oil & Gas Co., Box 591, Tulsa, Okla.	45
Wiedenmayer, Carl, Societa Petrolifera Italiana, Fornova Taro (Parma), Italy.	26
Wiegand, Frederick William, Wiegand Bros. Drlg. Co., 1509 Milam Bldg., San Antonio, Tex.	36
Wilbert, Louis Joseph, Jr., Louisiana State Univ., Baton Rouge, La.	40
Wilcox, Charles R., Walter Duncan Oil Properties, Box 206, Mt. Vernon, Ill.	47
Wilcox, Fred H., Magnolia Petr. Co., Box 900, Dallas, Tex.	29
Wilcox, Stanley William, Seismograph Service Corp., Apt. 1488, Caracas, Venezuela, S. A.	40
Wiley, Richard Allen, Amerada Petr. Corp., 1811 Neils Esperson Bldg., Houston, Tex.	48
Wiley, Samuel Rogers, Univ. of Texas, Austin, Tex.	47
Wilgus, Wallace LaFetra, Shell Oil Co., Inc., Box 193, New Orleans, La.	44
Wilhelm, Arthur K., Cities Service Oil Co., 704 Empire Masonic Bldg., Bartlesville, Okla.	28
Wilhelm, Oscar, Shell Oil Co., Inc., Box 2099, Houston, Tex.	41
Wilkes, Betty Jeanne, Humble Oil & Refg. Co., Box 1600, Midland, Tex.	48
Wilkins, Edwin Lewis, Danciger Oil & Refg. Co., Baton Rouge, La.	45
Wilkinson, Frances Tuttle, 7 Second St., Walden, N. Y.	44
Willard, Max Emery, U. S. Geol. Survey, 100 Nashua St., Boston, Mass.	43
Williams, Carroll L., Humble Oil & Refg. Co., Box 117, Pleasanton, Kan.	37
Williams, Charles C., U. S. Geol. Survey, Cheyenne, Wyo.	46
Williams, Charles Coburn, Seismic Engineering Co., 6111 Maple Ave., Dallas, Tex.	40
Williams, Charles Hiram, Amerada Petr. Corp., 1811 Neils Esperson Bldg., Houston, Tex.	44
Williams, Edwin P., Geol. Survey of Canada, Vancouver, B. C., Canada.	44
Williams, Francis S., consulting, 423 S. Maple, McPherson, Kan.	24
Williams, George Arthur, Rt. 37, Box 105-G, El Paso, Tex.	43
Williams, George C., consulting, 1843 W. Forty-seventh St., Los Angeles, Calif.	27
Williams, George O., consulting, 2125 N. W. Sixteenth St., Oklahoma City, Okla.	27
Williams, Harold L., Paleontological Lab., Box 51, Midland, Tex.	45
Williams, Herbert E., independent, 1209 Second Natl. Bank Bldg., Houston, Tex.	26
Williams, J. Stewart, Utah State Agricultural College, Logan, Utah	37
Williams, John Blaine, Gulf Oil Corp., Crane, Tex.	43
Williams, John Raynesford, The Texas Co., Box 1737, Shreveport, La.	37
Williams, Lou, Univ. of Chicago, Chicago, Ill.	41
Williams, M. Dean, International Petr. Co., Apt. 1081, Lima, Peru, S. A.	46
Williams, Meryl Dedrick, Seaboard Oil Co., Box 563, Ardmore, Okla.	42
Williams, Milton, Humble Oil & Refg. Co., Box 2180, Houston, Tex.	47
Williams, Norman Francis, Arkansas Resources & Devel. Comm., 446 State Capitol Bldg., Little Rock, Ark.	46
Williams, Philip Anthony, Carter Oil Co., Box 291, Vernal, Utah	41
Williams, Richard, Seismic Engineering Co., Palestine, Tex.	44
Williams, Robert Neil, Jr., Honolulu Oil Corp., 221 Balboa Bldg., Santa Barbara, Calif.	38
Williams, Thomas B., Dept. of Lands, Petr. & Natural Gas Conservation Board, Parliament Bldg., Victoria, B. C., Canada.	30
Williams, William Alfred, consulting, Box 265, Capitola, Calif.	19
Williams, William Paul, New Jersey Zinc Co., Franklin, N. J.	45
Williamson, Harry, Abilene Log Service, Box 568, Abilene, Tex.	37
Williamson, Thomas F., Iraq Petr. Co., Ltd., Box 309, Haifa, Palestine.	32
Willis, Clifford L., Univ. of Washington, Seattle, Wash.	40
Willis, Cornelius G., Basin Oil Co., 750 Subway Terminal Bldg., Los Angeles, Calif.	25
Willis, Robin, Hildon Oil Co., 1135 Subway Terminal Bldg., Los Angeles, Calif.	27
Willis, S. Morse, independent, 2913 S. Quaker, Tulsa, Okla.	24
Willis, Vernon Howe, Four-W. Oil Co., Box 881, Corsicana, Tex.	44
Williston, Samuel H., Horse Heaven Mines, Inc., 702 Mechanics' Inst. Bldg. San Francisco, Calif.	24
Wills, Neil H., consulting, Box 529, Carlsbad, N. Mex.	34

Willson, John Norman, British-American Oil Co., Ltd., 209 Sixth Ave., W., Calgary, Alta., Canada.....	47
Willson, Kenneth M., independent, 190 E. Park St., Durango, Colo.....	29
Wilpolt, Ralph Henry, Mina Tiro General, Charcas, S. L. P., Mex.....	45
Wilsey, James Arthur, Jr., Princeton Univ., Princeton, N. J.....	44
Wilshire, L. M., Skelly Oil Co., 1505 First Natl. Bldg., Oklahoma City, Okla.....	23
Wilson, Arthur Noble, consulting, 915 Second Natl. Bank Bldg., Houston, Tex.....	40
Wilson, Cedric Clark, Trinidad Petr. Devel. Co., Ltd., Palo Seco, Trinidad, B. W. I.....	40
Wilson, Charles Lewis, Austin Coca Cola Co., Austin, Minn.....	43
Wilson, Charles William, Jr., Vanderbilt Univ., Nashville, Tenn.....	38
Wilson, Edward B., Sun Oil Co., Tyler, Tex.....	22
Wilson, Eldred Dewey, Arizona Bureau of Mines, Univ. of Arizona, Tucson, Ariz.....	46
Wilson, Ernest Bradley, Sterling Oil & Refg. Corp., 1709 Sterling Bldg., Houston, Tex.....	41
Wilson, Eugene England, Berg Geophysical Co., Farmington, N. Mex.....	40
Wilson, Forest Wayne, American Republics Corp., Petr. Bldg., Houston, Tex.....	40
Wilson, Fuller Hugh, Tide Water Assoc. Oil Co., Box 1448, Jackson, Miss.....	48
Wilson, Ivan Franklin, American Embassy, Paseo de la Reforma 64, Mexico, D. F., Mex.....	41
Wilson, James Ernest, Jr., Explor., Shell Oil Co., Inc., Box 2010, Wichita Falls, Tex.....	40
Wilson, James Lee, 70 Central Ave., New Haven, Conn.....	44
Wilson, James Neff, Seismograph Service Corp., Box 1500, Tulsa, Okla.....	43
Wilson, Joe G., The Texas Petr. Co., Apt. 267, Caracas, Venezuela, S. A.....	31
Wilson, John H., Independent Explor Co., 1411 Electric Bldg., Fort Worth, Tex.....	21
Wilson, Joseph M., independent, 707 Continental Bldg., Dallas, Tex.....	22
Wilson, Louis R., Carter Oil Co., 1300 Apco Tower, Oklahoma City, Okla.....	46
Wilson, Malcolm E., General American Oil Co., Dallas, Tex.....	20
Wilson, Ralph Woodrow, Baroid Well Logging Service, 720 City Natl. Bank Bldg., Houston, Tex.....	46
Wilson, Richard M., The Ohio Oil Co., Box 1120, Shreveport, La.....	38
Wilson, Robert Rogers, consulting, 1565 Altivo Way, Los Angeles, Calif.....	30
Wilson, Ruth Blanchard, Rt. 3, Box 303, Excelsior, Minn.....	44
Wilson, Thomas C., Venezuelan Atlantic Refg. Co., Apt. 893, Caracas, Venezuela, S. A.....	30
Wilson, Wallace Woodrow, Univ. of Texas, Austin, Tex.....	45
Wilson, Walter B., Gulf Oil Corp., Box 661, Tulsa, Okla.....	21
Wimbish, Forrest E., Magnolia Petr. Co., Box 1828, Oklahoma City, Okla.....	28
Wines, Donald Bradford, Mid-States Oil Corp., Tulsa, Okla.....	29
Winfrey, Donald B., Petty Geophysical Engineering Co., Box 651, Casper, Wyo.....	31
Wing, Robert Busch, Shell Oil Co., Inc., Box 1101, Tulsa, Okla.....	38
Winham, W. P., Standard Oil Co. of Calif., 605 W. Olympia, Los Angeles, Calif.....	28
Winkler, Bruno Oscar, Standard-Vacuum Oil Co., Rm. 648, 26 Broadway, New York, N. Y.....	31
Winkler, Hans, Sun Oil Co., Box 1861, Midland, Tex.....	31
Winkler, Virgil Dean, Geol. Lab., Creole Petr. Corp., Apt. 880, Caracas, Venezuela, S. A.....	40
Winter, Niles B., The Atlantic Refg. Co., Box 871, Midland, Tex.....	24
Winton, Will M., Texas Christian Univ., Fort Worth, Tex.....	20
Winzler, Alvin Raymond, Stanolind Oil & Gas Co., Box 680, Jackson, Miss.....	40
Wiringa, Leon Otis, Shell Oil Co., Inc., 2000 Alamo Natl. Bldg., San Antonio, Tex.....	37
Wise, Blanche Lorraine, U. S. Geol. Survey, Denver, Colo.....	47
Wise, Henry Francis, United Geophysical Co., Seismos 61, Villavicencio, Colombia, S. A.....	42
Wise, James Sharples, Wise Drlg. Co., Okmulgee, Okla.....	42
Wise, Richard Atlee, Socony-Vacuum Oil Co., Apt. 246, Caracas, Venezuela, S. A.....	47
Wisehart, A., Paul, 211 Cross Valley Rd., Rt. 12, Knoxville, Tenn.....	45
Wisser, Edward Hollister, consulting, 204 Sharon Bldg., San Francisco, Calif.....	46
Wissler, Stanley G., Union Oil Co. of Calif., Box 511, Compton, Calif.....	27
Witherspoon, Edgar, Witherspoon Finance Co., Ada, Okla.....	40
Witkind, Irving Jerome, U. S. Geol. Survey, Golden, Colo.....	48
Wofford, Henry Rollins, Jr., Standard Oil Co. of Argentina, Avenida Roque Saenz Pena 567, Buenos Aires, Argentina, S. A.....	35
Wolcott, Richard Hastings, Sohio Petr. Co., Mt. Pleasant, Mich.....	43
Wold, John Schiller, Barnsdall Oil Co., 2212 Experson Bldg., Houston, Tex.....	41
Wolf, Albert G., Texas Gulf Sulphur Co., 1009 Second Natl. Bank Bldg., Houston, Tex.....	24
Wolf, George H., Keystone Explor. Co., 2813 Westheimer Rd., Houston, Tex.....	43
Wolf, Michael Walter, The Calif. Co., 1023 U. S. Natl. Bank Bldg., Denver, Colo.....	46
Wolf, Deane, J., Kerlyn Oil Co., 2020 First Natl. Bldg., Oklahoma City, Okla.....	23
Wolfram, Bertram, Jr., Seismic Explor., Inc., 2911 Gulf Bldg., Houston, Tex.....	43
Wolverton, Harold A., Halliburton Oil Well Cementing Co., Oklahoma City, Okla.....	41
Womack, Brame, Sohio Petr. Co., Box 1667, Shreveport, La.....	34

Womack, Robert, Jr., The Calif. Co., Box 202, Brookhaven, Miss.	45
Wonfor, John Stephen, Canadian Gulf Oil Co., 301 New Telephone Bldg., Calgary, Alta., Canada	47
Wood, Alexander Wayne, Phillips Petr. Co., Box 708, Bartlesville, Okla.	47
Wood, Clint B., Wood & Hunt Drlg. Co., Wichita Falls, Tex.	46
Wood, Fred E., Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago, Ill.	24
Wood, George R., Geophoto Services, Inc., 305 E. & C. Bldg., Denver, Colo.	30
Wood, James T., Jr., The Texas Co., 929 S. Broadway, Los Angeles, Calif.	24
Wood, Jay Pendleton, Humphreys Gold Corp., 910 First Natl. Bank Bldg., Denver, Colo.	27
Wood, Mary C., Tide Water Assoc. Oil Co., Houston, Tex.	46
Wood, Owen Bishop, The Atlantic Refg. Co., Box 1346, Houston, Tex.	39
Wood, Robert H., Broswood Oil Co., 416 Beacon Bldg., Tulsa, Okla.	20
Wood, Virgil O., Broswood Oil Co., 416 Beacon Bldg., Tulsa, Okla.	20
Woodbury, Homer Olwin, The Calif. Co., Box 837, Casper, Wyo.	42
Woodford, Alfred O., Pomona College, Claremont, Calif.	24
Woodman, Kermit Thomas, Sohio Petr. Co., 514 Bitting Bldg., Wichita, Kan.	46
Woodring, Wendell P., U. S. Geol. Survey, Washington, D. C.	43
Woodruff, Elmer Grant, U. S. Engineers, Wright Bldg., Tulsa, Okla.	19
Woods, E. Hazen, Sinclair Prairie Oil Co., Midland, Tex.	25
Woods, Peter Gerald, Jr., Pacific Western Oil Corp., Bakersfield, Calif.	45
Woods, Raymond Douglas, Humble Oil & Refg. Co., 1065 Humble Bldg., Houston, Tex.	35
Woods, Robert E., General Petr. Corp., Los Angeles, Calif.	45
Woods, Sam H., Sun Oil Co., Box 1348, Tulsa, Okla.	25
Woodstone, Henry R., Bay Petr. Corp., Midland Savings Bldg., Denver, Colo.	38
Woodward, Albert Fletcher, Union Oil Co. of Calif., Los Angeles, Calif.	38
Woodward, George Edward, Jr., Western Seismograph Supply Co., Oklahoma City, Okla.	29
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Woodward, Jack Spurgeon, consulting, Republic Bank Bldg., Dallas, Tex.	45
Woodward, Truman Pendleton, Carter Oil Co., Box 1730, Shreveport, La.	39
Woodward, Walter Thomas, U. S. Geol. Survey, Taft, Calif.	38
Woodard, George Prior, Princeton Univ., Princeton, N. J.	45
Woollett, LeRoy Andrew, Jr., 1132 W. Woodlawn Ave., San Antonio, Tex.	47
Woolley, John Bernard, United British Oilfields of Trinidad, Point Fortin, Trinidad, B. W. I.	46
Woolley, William Leeman, Mid-Continent Petr. Corp., Midland, Tex.	44
Woolnough, Walter George, c/o W. L. Woolnough, "Callabonna," Park Ave., Gordon, N. S. W., Australia	29
Woolsey, E. V., consulting, Box 268, Luling, Tex.	20
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Workman, Lewis Edwin, Illinois Geol. Survey, Natural Resources Bldg., Urbana, Ill.	40
Worrell, Frank Hansen, The Ohio Oil Co., Chickasha, Okla.	42
Wosk, Louis David, Aztec Oil Co., 1838 Lucille Ave., Los Angeles, Calif.	24
Wrath, William Frederick, Bolsa Chico Oil Corp., Rm. 510, 555 S. Flower St., Los Angeles, Calif.	48
*Wrather, William Embury, U. S. Geol. Survey, Washington, D. C.	17
Wright, Andrew Clemmons, Shell Oil Co., Inc., Tyler, Tex.	20
Wright, Fay Linton, consulting, 811 W. Seventh St., Los Angeles, Calif.	27
Wright, Fred S., consulting, Box 1151, Midland, Tex.	20
Wright, Hugh, Texas Gulf Sulphur Co., 812 Subway Terminal Bldg., Los Angeles, Calif.	30
Wright, Kenneth A., Kenlyn Petr. Corp., 3545 Cedar Ave., Long Beach, Calif.	47
Wright, Randall, Univ. of Illinois, Navy Pier, Chicago, Ill.	35
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Wright, Thomas Goodman, Stanolind Oil & Gas Co., 429 First Natl. Bank Bldg., Wichita, Kan.	40
Wright, William Josiah, Canadian Dept. of Lands & Mines, Fredericton, N. B., Canada	42
Wright, Willis I., Socony-Vacuum Explor. Co., Calgary, Alta., Canada	47
Wyckoff, John Walter, Hdq. 8th Army M. G., A. P. O. 343, c/o Postmaster, San Francisco, Calif.	35
Wylie, James R., Jr., Huntley & Huntley, 1207 Benedum-Trees Bldg., Pittsburgh, Pa.	21
Wyman, Everett A., Amerada Petr. Corp., Box 2040, Tulsa, Okla.	24
Wynn, Albert, MacMillan Petr. Corp., Box 411, El Dorado, Ark.	41
Wynn, Warren H., Sinclair Prairie Oil Co., 7th Fl., Colcord Bldg., Oklahoma City, Okla.	26
Wynne, Hal C., Phillips Petr. Co., Bartlesville, Okla.	36
Wyszynski, Otton Wiktor Theissberg, consulting, 1396 N. Serrano Ave., Los Angeles, Calif.	39
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Yarborough, Hunter, Jr., Explor. Dept., Humble Oil & Refg. Co., Box 2180, Houston, Tex.	39
Yates, Harvey Emmons, consulting, Box 397, Artesia, N. Mex.	36

Yee, Bing Quai, 505 Chautauqua St., Norman, Okla.	47
Yenne, Keith Austin, Tropical Oil Co., Apt. 3533, Bogota, Colombia, S. A.	41
Yoakam, Coler A., independent, 1101 Petr. Bldg., Oklahoma City, Okla.	22
Yoakam, Harlan Hunter, Plymouth Oil Co., Box 712, Sinton, Tex.	29
Yoder, George M., Schlumberger Well Surveying Corp., Box 819, Laurel, Miss.	43
Yolton, James S., Creole Petr. Corp., Tenblador Dist., Caripito, Venezuela, S. A.	45
Young, Addison, consulting, First Natl. Bank Bldg., Midland, Tex.	30
Young, Claude T., American Trading & Prod. Corp., Midland, Tex.	27
Young, David Marion, Kentucky-West Virginia Gas Co., Prestonsburg, Ky.	46
Young, Jackson S., Union Prod. Co., Shreveport, La.	28
Young, John A., Jr., Sun Oil Co., Box 1270, McAllen, Tex.	43
Young, John Chew, Conservation Comm. of Calif. Oil Producers, Los Angeles, Calif.	46
Young, Keith P., Science Hall, Univ. of Wisconsin, Madison, Wis.	44
Young, Raymond Owen, North Venezuelan Petr. Co., Ltd., Apt. 592, Caracas, Venezuela, S. A.	42
Young, Umberto, Republic Petr. Co., 811 W. Seventh St., Los Angeles, Calif.	28
Young, W. Ford, American International Fuel & Petr. Co., Apt. 376, Managua, Nicaragua, C. A.	45
Young, Wilber H., Jr., Bradley Prod. Corp., Wellsville, N. Y.	35
Youngmeyer, Ray, Amerada Petr. Corp., Box 2026, Tyler, Tex.	21
Younquist, Walter Lewellyn, Univ. of Iowa, Iowa City, Iowa	45
Younkman, Harry D., Sinclair Prairie Oil Co., Box 521, Tulsa, Okla.	21
Yunck, George Feick, Pure Oil Co., Olney, Ill.	39
Yust, Morton Ripley, 1214 S. Baltimore, Tulsa, Okla.	45
Yzaguirre, Lauro Antonio, Lista de Correos, Cd. Camargo, Tamps., Mex.	43
Zaba, Joseph, c/o D. D. Feldman, 802 First Natl. Bank Bldg., Houston, Tex.	33
Zaikowsky, Michael Wladimir, The Texas Petr. Co., Apt. 267, Caracas, Venezuela, S. A.	43
Zapp, Alfred Dexter, U. S. Geol. Survey, Box 177, Univ. of New Mexico, Albuquerque, N. Mex.	42
Zavoico, Basil B., consulting, 220 E. Forty-second St., New York, N. Y.	25
Zethraus, Roy Calvert, Tide Water Assoc. Oil Co., Houston, Tex.	47
Ziebold, William O., Spartan Gas Co., Box 766, Charleston, W. Va.	29
Ziegler, Frederick McClain, Kern Oil Co., Ltd., Los Angeles, Calif.	39
Zimmerman, Sam, Standard Oil Co. of Egypt, S. A., 22 Sharia Kasr el Nil, Cairo, Egypt	31
Zimmerly, Richard Franklin, The Texas Co., Rock Springs, Wyo.	47
Zimmerman, Charles C., Keystone Explor. Co., Houston, Tex.	31
Zimmerman, James Z., consulting, Delmont, Pa.	22
Zimmerman, John, Jr., Permanente Cement Co., Permanente, Calif.	44
Zirbel, Nicholas Newton, Independent Explor. Co., 901 Esperson Bldg., Houston, Tex.	46
ZoBell, Claude E., Scripps Inst. of Oceanography, La Jolla, Calif.	21
Zoller, Lawrence J., Central Commercial Co., Box 2306, Tulsa, Okla.	21
Zoller, Victor Hubert, The Chicago Corp., Box 1047, Shreveport, La.	47
Zorichak, Joseph J., American Petr. Inst., 1205 Continental Bldg., Dallas, Tex.	24
Zuloaga, Guillermo, Creole Petr. Corp., Apt. 889, Caracas, Venezuela, S. A.	37
Zunino, Juan Jose, Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina, S. A.	42
Zwaid, Edwin Arnold, Union Prod. Co., Box 711, Beeville, Tex.	47

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McCand, Franklin Thresher
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Sartain, Maxwell Roland
JACKSON—Berger, Walter R., Jr.
MOBILE—Blackburn, Willis G.
Schoonmaker, George Russell
MONTGOMERY—Jones, Walter B.
OLARK—Larsen, Jack Kirby
SPRING HILL—Merry, Edward T.
SYLACAUGA—Sprengling, Kurt
TUSCALOOSA
Conant, Louis Cowles
Eargle, Dolan Hoyer
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Higgs, William Reginald
LaMoreaux, Philip Elmer
McGlamery, Winnie
Richards, Edward Franklin

ARIZONA

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SCOTTSDALE
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Feth, John Henry
Hubbard, Bela
Lockering, T. S.
McKee, Edwin D.
Wilson, Eldred Dewey

ARKANSAS

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Dennis, Wilbert Chalmers
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Evans, Robert Pierce
Fischer, Victor Nathaniel
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Harris, Roy
Hoke, Charles Jacob
Klinger, Edgar D.
Mackay, Donald K.
Meyer, Ruskin H.
Montgomery, Don D.
Wynn, Albert
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Baker, Roger Crane
Giles, Albert W.
Foreman—Kerr, John B.
FORT SMITH
Lewark, James Edward
HOT SPRINGS—Bean, Ward C.
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LITTLE ROCK
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Renfro, Charles A.
Williams, Norman Francis
MALVERN
Pond, Walter Franklin
TEXARKANA
McDowell, Alfred Norman
YELLEVILLE
Getzenbauer, Frank M.

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ALBANY—Pickrell, Daniel J.
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Stone, Richard O'Neill
ARCATA—Mayhew, Eldon Jay
ARVIN—Stockton, Frank R.

AVENAL—Klingaman, George L.
Knowlton, Drexel Robert
Roberts, Dwight C.
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Almgren, Alvin Arnold
Anderson, Jack Q.
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Berrymann, Raymond J.
Binkley, Margaret Delano
Binkley, William G.
Booth, William Norfolk
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Brooks, Tennant Julian
Bryan, Joseph Jefferson
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Fitzgerald, Thomas J.
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Johnson, Rolfe Sherman
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McMasters, John Herbert
Meat, Roy G.
Millhauser, James Dewitt
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Phillips, Rose Marvin
Pickett, Ed. S.

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Powell, William Eugene
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Rist, Robert L.
Roth, George Helm
Saunders, Lowell W.
Scott, David Holcomb
Shoemaker, Richard Walter
Siemon, Paul
Sklar, Maurice
Snaveley, Parke Detweiler
Snedden, Loring B.
Sprague, Harry A.
Stinemeyer, Edwin Humer, Jr.
Stokesbury, Walter Allen
Suverkrup, Lew
Turner, Roy Wilbur
Vallat, Eugene H.
Van Beveren, O. F.
Warne, Archer Hurst
Weddle, Herman W.
Wells, Robert Jackson
Woods, Peter Gerald, Jr.
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Durham, John Wyatt
Gilbert, Charles Merwin
Herrick, Henry N.
Hulin, Carlton D.
Klempell, Robert M.
Lawson, Andrew C.
Loudback, George D.
Uren, Lester C.
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Haenke, Martyn Churchill
Pellekaan, W. Van Holst
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CARPINTERIA
Fine, Spencer Freeland
Schwade, Irving T.
Sheller, James Warner
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Hollister, Joseph S.
CHICO—Neumann, Fred R.
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Shelton, John Sewall
Woodford, Alfred C.
COALINGA
Bryan, Francis Lackner
COMPTON—Fritz, Edward Blake
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Wissler, Stanley G.
CULVER CITY
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Holman, W. H.
FELLOWS
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Brink, John Westlake
Hobe, Carl H.
GLENDALE—Gillan, Silas L.
Herold, Stanley C.
Van Couvering, Martin
GLENORA
Mull, Bert Hathaway
HOLLYWOOD
Cabeal, William Ross
Galeski, Robert Benjamin
Gardner, A. Macley
Sullwold, Harold H., Jr.
Wescott, Lois Regina
HUNTINGTON PARK
Agee, Flint Humphrey
Thomas, Clark Lee
KING CITY—Ashauer, Hans F.
LA CANADA
Macmillan, Andrew James, Jr.

LAGUNA BEACH
Edwards, Everett C.
Forker, William S.
Smith, Marcus Ayres Joseph
LA JOLLA
Ferguson, Kenneth Sears
McCollom, C. R.
Revelle, Roger R. D.
Shepard, Francis Parker
Zobell, Claude E.

LOMITA
Natland, Manley Leonard
LONG BEACH
Albright, Charles C., Jr.
Armstrong, Ursel Sidney
Ballantyne, Richard S., Jr.
Bankhead, Charles Carr, Jr.
Carliste, Frederick MacKlin
Carrey, Albert A.
Chase, James L.
Cress, Rodman Kay
Dudley, Paul H.
Ford, Robert Davis
Gentry, Albert William
Hill, Robert Cowdry
Kuffel, George Cole
Landis, Sam Wallace
Miller, Guy E.
Park, Stafford
Pearson, Raymond Elliott
Perry, Bernard James
Feland, Joseph F.
Porter, John Lewis
Preece, Rae
Prewett, Charles W.
Rothwell, William Thomas, Jr.
Taylor, Dewitt E.
Taylor, Louis
Ten Eyck, Warren E.
Wheeler, August Edward
Wright, Kenneth A.
LOS ALTOS—Stebinger, Eugene
LOS ANGELES—Abel, Walter D.
Adams, Bradford Clarendon
Anderson, James Burt
Anderson, Robert Edwin
Anderson, Thomas Corwin III
Armstrong, Harold K.
Atwill, E. R.
Bailey, James P.
Baldwin, Thomas Armet
Barker, William Kilmer
Barley, Kemp Elmo
Barlow, Victor
Barnes, Roy M.
Barnes, Sydney Urbane
Barnes, Thomas Reed
Bartosh, Edmund J.
Beal, Carlton
Bear, Ted Lee
Bell, Gordon Rutledge
Benzley, James C.
Bevan, Stewart
Blodgett, Ward B.
Bode, Francis Dushwood
Borax, Eugene
Born, Milton
Bowes, Glenn H.
Bramlette, Milton N.
Bransford, James C.
Bronner, Finn Eyolf
Buddenhagen, W. H. J.
Bundy, Douglas
Burns, Russell Warren
Burtt, John G.
Carman, Ann Oakley
Carter, Frank B.
Cerini, William Ferdinand
Chambers, Lawrence Shiner
Chappuis, Louis C.
Chastain, Lawrence W.
Clark, Harold Joseph

- Clark, Marie J.
Clark, Robert W.
Clement, Paul F.
Clements, Thomas
Clute, Walker S.
Cohn, Arthur A., Jr.
Cole, John Gordon
Collom, Roy E.
Corby, Grant W.
Corey, William Henry
Cox, Harris J.
Crandall, Richard R.
Creed, James Gordon
Crosby, Arthur S.
Crowell, John Chambers
Crown, Walter J.
Curran, John F.
Cutler, Willard W., Jr.
Davis, Elmer Fred
DeGoes, Louis Lellanne
de Koch, William G.
DeMaria, Elmer L.
Detrick, Dana Farrington
Diven, Quay S.
Dorance, James R.
Driver, Herschel L.
Durrell, Cordell
Earl, Glenn M.
Easton, William Heyden
Eaton, Joseph Edmund
Eckis, Rollin
Edwards, Merwin G.
Egleston, William Stokes
Elam, Jack Gordon
Emery, Kenneth Orris
English, Leon E.
English, Walter A.
Erickson, Earling Lester
Evans, Louis H.
Fackler, John Henry
Feldmeyer, Arthur E.
Ferguson, K. N.
Follansbee, George Sherman, Jr.
Folsom, Tom Erwin
Ford, Waldo Emerson, Jr.
Fortine, Dwight H.
Fothergill, Harold Lawrence
Gale, Hoyt Rodney
Gardett, Peter H.
Garipey, Glen Bernard
Geis, Wilfrid H.
Giffin, Wilson C.
Gilbert, Orrin Wilfred
Gilluly, James
Goddie, Harry Anthony
Goudkoff, Paul P.
Grant, U. S.
Graves, Doyle Theodore
Greene, Ray G.
Grinsfelder, Sam
Hale, John Darrow
Hall, Edwin B.
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Handin, John W.
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Harkness, Dorothy Viola
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Hazard, John Charles
Heintz, Louis Otto
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Higgs, Morton T.
Hillis, Donuil L.
Holston, Ashley Stanford
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Johnson, Curtis Herman
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McCollough, Edward H.
McConville, Robert John
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McNaughton, Duncan A.
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Metzner, Loyde Henry
Michelin, James
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Miller, Lloyd C.
Miller, Robert H.
Minshall, Francis Edward
Moran, Robert B.
Moran, William Rodes
Morgan, Frank A.
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Noble, Earl B.
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Ogier, E. H.
Ogle, Burdette Adrian
Oliver, Graydon
Osborne, Clarence B.
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Patterson, George Benjamin
Patterson, Robert D.
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Reel, Cecil E.
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Ruth, John William
Salvatori, Henry
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Simonsen, Russell Ray
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Smith, Hampton
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Soper, Edgar K.
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Stewart, Irvine E.
Stewart, Sam
Stipek, Raymond J.
Stolz, Harry Phillip
Sumpf, Robert
Swayze, Ronald O.
Ten Eyck, Richard
Thornburgh, Hubert Robert
Torkelsen, O. I.
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Vitt, Alfred Weston
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Watson, C. P.
Watson, Elizabeth Anne
Wents, John Henry, Jr.
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Willis, Cornelius G.
Willis, Robin
Wilson, Robert Rogers
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Woodward, Albert Fletcher
Wosk, Louis David
Wrath, William Frederick
Wright, Fay Linton
Wright, Hugh
Wyszynski, Otton W. T.
Young, John Chew
Young, Umberto
Ziegler, Frederick McClain
LYNWOOD
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McKIRTRICK
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MIDWAY CITY—Gibson, Lee W.
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OAKLAND
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Wall, Earle R.
Orcutt
Manlove, Charles Francis
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de Chadenedes, Jean Francois
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Dennis, Terence Edwin
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Fuller, Oscar Kenneth, Jr.
Gerdes, Carl Herman
Gutenberg, Beno
Heald, Charles Leslie
Hoover, Herbert, Jr.
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Kelley, Howard Allen
Kinney, Douglas Merrill
Morris, Lawrence Kendall
Myers, Desaix B.
Newman, George Hawkins
Robertson, George Kenneth
Sharp, Robert Phillip
Smith, Colin Hubbard
Soske, Joshua Lawrence
Stauffer, Clinton R.
Stock, Chester
Van Amringe, Edwin Verne
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PASO ROBLES
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Curtis, Garnisa Hearfield
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ROSEMEAD
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SACRAMENTO
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Smith, Lyle Wyman
Sturdevant, Rayman
SALINAS
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Meredith, Helen June King
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SAN FRANCISCO
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Church, Clifford C.
Cunningham, Lorin A.
Cross, Charles Mumaw
Cunningham, George M.
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Davies, Herman F.
Decius, L. Courtney
de Laveaga, Miguel
Duce, James Terry
Etherington, Thomas J.
Findlay, Willard Alexander
Frey, Maurice Gordon
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Galbraith, Thomas J.
Gaylord, E. G.
Gester, George C.
Gester, Stephen H.
Hanna, G. Dallas
Hardy, Norman
Hawley, Henry J.
Heater, W. E.
Henry, Schuyler B.
Hill, Arthur Lionel
Hudson, Frank S.
Jenkins, Olaf P.
Kew, William S. W.
Lebkicher, Roy
Lund, Gage V.
Maddox, Eleanor Jean
McNab, James
Menken, Fred A.
Miller, Robert P.
Moody, Graham B.
Neuschel, Sherman K.
Simpson, Edward Cannon
Smith, James Archibald
Solari, Allison Jarvis
Stach, Leopold William

Stalder, Walter
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Stoner, Reg. C.
Thomas, John William
Williston, Samuel H.
Wisser, Edward Hollister
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SAN GABRIEL
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Arnold, Ralph
Birkhauser, Max
Hodges, Frederick C.
SAN MATEO—Knox, George L.
SAN PEDRO
Mayuga, Manuel Nieve
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Gardner, Dion Lowell
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Rand, William Whitehill
Redwine, Lowell Edwin
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Regan, Louis J., Jr.
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Moir, Leo Hughes, Jr.
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Muller, Siemon William
Myers, Donald Arthur
Salvador y Diaz, Amos
Schenck, Hubert G.
Stauffer, Hans Karl
Tickell, Frederick G.
Vander Hoof, Vertress Lawrence
Waters, Aaron Clement
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Bainton, Jack Douglas
Burtner, Evan Hughes
Coenen, Edward J.
Drake, Cecil
Ellison, Burton Rolland
Kris, Stanislaw Jaroslav
Millard, Norman J.
Reed, Everett Taylor
Reynolds, Sargent M.
Rieder, Janet Elizabeth
Ritzius, DeVaun Ervin
Turham, Arthur F.
Webb, Byron K.
Wells, John Cawse
Woodward, Walter Thomas
TAMOR VALLEY
Allen, Charles Francis
UPLAND—Nisbet, John N.
VALVERDE—Noble, Levi F.
VAN NUYS—Fisher, Arnold J.
VENTURA—Bailey, Thomas L.
Bright, Eleanor Jane Young
Dibblee, Thomas Wilson, Jr.
Greenlee, Donald E.
Hawk, William Chester
Hertel, Francis W.
Leach, Claude E.
Lewis, Lloyd Alan

Neel, Henry Howard
Paschali, Robert Henry
Fustmueller, Paul S.
Sansone, John B.
Sears, David Hume
Sprinkel, Robert Lee, Jr.
Thomas, William Henry
Walters, Charles Philip
Weller, Arthur Reilly
Whaley, Harry Max
VERNON—Merritt, Floyd C.
WHITTIER—Bemis, Harold C.
Gardiner, Chester M.
Jones, Joseph Maxfield

COLORADO

ARVADA—Hurd, Clinton O.
AUSTIN—Sax, Norman Alfred
BOULDER—Andrews, Philip
French, Harvey F.
Goldstein, August, Jr.
Griffiths, Mary Oswald
Hares, C. J.
Hayes, John R.
Hile, Charles O.
Hilkey, William Warren
Rohwer, Frank W.
Thompson, Warren O.
COLORADO SPRINGS
Beardsley, William R.
Gould, Don B.
Mathias, Henry Edwin
Oborne, Harry W.
CORTEZ—Ryan, Reginald G.
CRAGA—Hurry, Floyd Philip
Keenan, James Edward
Nance, James Weldon
Saterdahl, Alfred
Smythe, John Archibald
DENVER—Anderson, Robert Lee
Arnold, Harry H., Jr.
Ashley, Burton Edward
Aurand, Harry A.
Austin, Robert Burton
Bass, N. Wood
Becker, Raymond C.
Beckmann, Lawrence J.
Bench, Bernard Mayes
Birmingham, Edward Louis, Jr.
Blair, Robert William
Boos, C. Maynard
Bosco, Francis Neal
Brainerd, Arthur E.
Bramlette, William Allen
Brown, Orman Pearson
Brundall, Laurence
Buehler, Karl Martin
Carter, Stuart Lyle
Christensen, H. E.
Collins, C. Philip
Crowley, Appleton Joseph
Cullen, Albert William
Davison, Wayne Corey
Dobbin, Carroll E.
Dobrovolsky, Ernest
Doeringsfeld, Walter W., Jr.
Dorn, Conrad L.
Downs, George Reed
Durham, James Harmon
Elliott, Elizabeth Anne
Evans, David Morgan
Folson, Lucas Wendell
Forcade, Kirk Charles
Frazier, Gaylord G.
Fuenning, Paul
Gabelman, John W.
Gow, Kenneth L.
Griffith, Elizabeth
Hamilton, Edward Alricks
Harder, Banhart Pete
Harrison, Thomas S.
Hayes, James A., Jr.
Heaton, R. L.
Heeren, Julius Anthony
Hendrickson, Victor J.

Hurd, E. Gordon
Kinsler, James Hanford
Kirby, James M.
Knapp, Lealand Morley
Lavington, Charles S.
Lohman, Stanley William
Manion, Clarence E.
Marble, Kennedy R.
Marshall, John
Mason, John Haviland
McClure, Perry S.
McCoy, Alexander Watts, III
McKnight, C. R.
McLaughlin, Thad G.
McMillan, Robert
Miller, David B.
Miller, Victor Charles
Munoz, Robert Redman
Nelson, Walter S.
Newton, William A.
Paterson, Robert
Pickering, Warren Yale
Powell, Luther Clinton
Rath, Charles M.
Rennie, Waldo E.
Roark, Louis George
Robbins, Raymond Willis
Schlocker, Julius
Scudder, Ernest W.
Shaw, Everett S.
Sloan, Raymond D.
Smith, J. Fred, Jr.
Smith, Vernon Zay
Stewart, Hugh A.
Thompson, William Allen
Thomson, Harry L.
Thrasher, Glen Clair
Tichy, James Robert
Turner, Joseph H.
Vanderwilt, John W.
Vieaux, Don George
Volk, Russell H.
Waggoner, Eugene B.
Wagner, C. Philip
Walter, Karl L.
Wantland, Dart
Wasem, A. Richard
Wegemann, Carroll H.
Wiseman, J. Barney
Wise, Blanche Lorraine
Wolf, Michael Walter
Wood, George R.
Wood, Jay Fendleton
Woodstone, Henry R.
DURANGO—Bald, Warren Arthur
Borden, Joseph L.
Boring, Myriell James
Brown, Otto E.
Dunn, Burton Crawford
Enders, Dean W.
Ferrell, Max Everett
Lilly, Otis J.
Lintz, Joseph, Jr.
Mitchell, James G.
Tatum, James L.
Willson, Kenneth M.
FORT COLLINS
Davis, Ralph Aden
Harris, David Vernon
FORT LUPTON
Whitney, F. L., II
GOLDEN
Brawner, John Douglas, Jr.
Ferris, Bernard Joe
Heiland, Carl A.
Holmer, Ralph Carroll
Johnson, J. Harlan
LeRoy, Leslie Walter
Levings, William Stephen
Mater, Warren D.
O'Boyle, Charles C.
Parker, Ben H.
Stommel, Harrison Edred
Van Horn, Richard
Van Tine, Arthur Benbrook
Van Tuyl, Francis M.

Witkind, Irving Jerome
GRAND JUNCTION
Holmes, Clifford N.
Mahannah, Rulon Stuart
Mundorf, T. Dean
Rauch, Wayne C.
LA JUNTA—Evans, Vincent
Ferber, Herbert James
Sheldon, Wichita F.
LONGMONT—Hobbs, Henry C.
Loomis, Harve
NATURITA
Fischer, Richard Philip
PUEBLO—Berwick, James D.
Peaker, Don H.
RANGELY
Addington, Harold Wallace
de Mohrenschildt, George
Hudson, William Taylor
Nelson, Gustave Allan
ROCKY FORD
Russom, Vaughn W.
SILVERTON
Chase, William Lynn
TRINIDAD—Larson, Theodore G.

CONNECTICUT

GREENWICH—Hinds, Henry
HARTFORD
Stone, Solon Wallingford
NEW HAVEN—Dunbar, Carl O.
Bateman, Alan M.
Longwell, Chester R.
Rodgers, John
Wilson, James Lee
STORRS—Lucke, John B.

DELAWARE

WILMINGTON
Budd, Montgomery Randolph
Gillon, Joseph L.

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Andrews, David Arthur
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Bates, Charles Carpenter
Bradley, Wilmot Hyde
Bryson, Robert P.
Carroll, Don L.
Cerkel, J. David, Jr.
Cooper, Chalmers Lewis
Craig, Lawrence Carey
Dane, Carl H.
Dorr, Edith Ann Pierce
Dorr, John Van Nostrand, II
Duncan, Donald C.
Farrell, Agnes M.
Gardner, Julia
Gardner, Louis S.
Hass, Wilbert Henry
Hawkins, Harold H.
Henbest, Lloyd G.
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Hoffer, Clarence Wilfred
Hoffman, Malvin G.
Imley, Ralph Willard
King, Philip B.
Knechtel, M. M.
Knight, J. Brookes
Kotick, Ottmar Frank
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McGhee, George Crews
Miller, Ralph LeRoy
Miser, Hugh D.
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Moore, Charles L.

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Payne, Thomas Gibson
Pierce, William G.
Pike, Sumner Tucker
Reeside, John Bernard, Jr.
Richards, Ralph W.
Rubey, William W.
Sayre, Albert Nelson
Sears, Julian D.
Sherman, Wilbur Brown
Singewald, Quentin D.
Sohn, Israel G.
Spratt, Robert Elmer
Stead, Frank W.
Stephenson, Lloyd W.
Straley, H. W., III
Stringfield, Victor Timothy
Trager, Earl A.
Trask, Parker D.
Vaughan, T. Wayland
Walters, Mason G.
White, Tell Thompson
Woodring, Wendell P.
Wrather, William Embury

FLORIDA

ATMORE—Myers, Marion Dale
EVERGLADES
Smith, Rex Milburn
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Campbell, Robert B.
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MIAMI—Parker, Gerald Gordon
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Whitney, Paul B.
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Cathcart, James Bacheider, Jr.
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Nolan, Philip Edward
STARKE
Parker, Norbert Allen
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Clark, Robert Scarth
Farlee, Richard Wilson
Fisher, Dunbar Allen
Gunter, Herman
Jordan, Louise
Kirby, Louise C.
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Malkin, Doris S.
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McC Campbell, William G., Jr.
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Munroe, Donald J.
Murchison, Eugene A.
Oles, Paul S.
Payne, Bill R.
Raasch, Albert Charles, Jr.
Rainwater, Edward Harriman
Rodgers, Thompson Deane
Rogers, William Donald
Schulz, Lois Jane
Seilin, Hilding A.
Smith, Norman Cutler
Spaulding, Bernard B.
Tierny, James A., Jr.
Vernon, Robert Orion
Wade, Wallace Lee
Walter, Henry Glenn
TAMPA
Ferguson, Fred Travis

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Peyton, Garland
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EMORY UNIVERSITY
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Cox, William Jones, Jr.
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Gulde, Andros
Smith, John Peter
Turner, Jonathan Douglas
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Hager, Dorsey
Hardin, Clifford Garland
Lester, John Lawrence
Mylius, L. A.
CHICAGO—Cram, Ira H.
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Hopkins, James
Pelto, Chester Robert
Pettijohn, Francis John
Richardson, Eugene Stanley, Jr.
Smith, Lawrence Henry
Sorrells, Warren Douglas
Taylor, Marilyn Louise
Thomas, Harold Scott
Wadell, Hakon A.
Wasson, Theron
Veller, J. Marvin
Williams, Lou
Wood, Fred E.
Wright, Randall
CHILLICOTHE—Edson, Fanny C.
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Bristol, Hubert Masters
Luttrell, Homer H.
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EVANSTON
Brown, Glen Francis
Dapples, Edward Charles
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Krominger, Joseph Franklin
Sloss, Laurence Louis
HIGHLAND PARK
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MANITO
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MATTOON—Ackley, Kenneth A.
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Anderson, Rudolph Faraday
Bean, Beryl Kenneth
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Doh, Charles A.
English, Robert M.
Farmer, Paul
Fender, Hollis Blair
Harris, Lloyd Addis
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Richards, Ben Howard, Jr.
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MT. CARMEL
Waterbury, H. Paul
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Galbreath, Glenn
Glass, Theodore Gunter
Harrington, Edward Willis
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Horton, Leo V.
Marvin, Gaurd Scott
McManamy, John Lyle
Neely, Joseph
Obering, Ernest A.
Raeiside, Elizabeth J.
Rehn, Edgar Ernest
Smith, Julian W.
Tuck, Louis Lester
Wall, Thomas E.

Whitney, Paul A.
Wilcox, Charles R.

OAK PARK

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OLNEY—Davies, Nathan G.
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Pampe, Carl Frederick
Yunck, George Feick

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Sutton, Arle Herbert

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Hockman, James N.
Savoy, Basil Victor
Tolle, Joseph Conrad
Whiting, Lester Leroy

SPRINGFIELD—Noll, Donald E.

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DeWolf, Frank W.
Hough, Jack Luin
Kline, Virginia Harriett
Koenig, Karl Joseph
Leighton, Morris M.
Lowenstam, Heinz A.
Meents, Wayne Franklin
Meyer, Marvin Phillip
Prescott, Gordon Walter
Pullen, Milton William, Jr.
Scott, Harold William
Siever, Raymond
Swann, David Henry
Townley, Enid
Wanless, Harold R.
White, George Willard
Workman, Lewis Edwin

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Weidman, Robert McMaster
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DeLong, James Henry, Jr.
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Egan, Martin G.
Elder, Stanley G.
Engel, Noel W.
Falletti, Antonio D.
Farrand, William Gardner
Georgesen, Niels Christian
Hawn, Margaret Hayward
Hones, Charles W.
Ingham, W. I.
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Kemp, Edward Rogers
Lewis, Kenneth W.
MacKnight, Frank Colletter
Nowlan, Harry H.
Pelley, William Ernest
Pierce, Isaac J.
Potet, James Harold
Rogers, Maynard
Sackett, H. F.
Sehnert, Harold Glen, Jr.
Snider, George W.
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Taylor, George Ernest
Townsend, Halstead Malkin

FARMERSBURG—Heap, George E.

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MT. VERNON
Forsyth, Roden James

NEWBURGH

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NOTRE DAME
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Smith, Knowles B.

VINCENNES—Sprowls, Harlan A.

IOWA

AMES

Kassander, A. Richard, Jr.
Roy, Chalmers J.

BRANDON

Stainbrook, Merrill A.

IOWA CITY

Cooper, James Blair
Harris, Stanley Edwards, Jr.
Miller, Arthur K.
Tester, Allen Crawford
Trowbridge, Arthur C.
Youngquist, Walter Lewellyn
SEYMOUR—Ruby, Glen M.

KANSAS

ABILENE—Verckler, Stewart P.
ARGONIA—Kaiser, Charles Philip
CHASE—Price, Arthur Sebert
COTTONWOOD FALLS
Hilton, Willard Ordway

ELDORA

Berry, George F., Jr.
Brooks, Arthur M.
Deputy, Paul R.
Sprague, William B.

ELLINWOOD

Matthews, Charles Leonard
FREDONIA—Stryker, William L.
GARDEN CITY—Alder, Frank J.

Lange, Robert William

GREAT BEND

Denman, Cedric Eugene
Knight, L. Clark
McCullough, Russell L.
McDaniel, Fred
Pryor, Myler Frank
Trimmell, John A.

HUGOTON

Orman, Freeman Lorenza, Jr.

INDEPENDENCE

Lee, Thomas William
Studd, Charles W.

IOLA—Page, James H.

KANSAS CITY

Smith, Rufus McBride

LAWRENCE

Bowsher, Arthur Leroy
Chakravorty, Sailendra Kumer
Frye, John Chapman
Jones, Ogden S.
Lalicker, Cecil Gordon
Landon, Lowell R.
Lee, Wallace
Leonard, Alvin R.
McBee, William, Jr.
McGregor, Duncan Junior
Moore, Raymond C.
Nixon, Earl K.
Stephenson, Eugene A.

MANHATTAN

Branson, John Wallace
Couser, Chester Wendell
McCreight, Claude Edgar, Jr.

MCPHERSON

Williams, Francis S.

OIL HILL

Hartwell, Charles Milby

OVERLAND PARK

Stevens, Ellick Groce

PITTSBURG

Abernathy, George Elmer
SALINA—Latta, Bruce Ferrel

SEDAN—Disney, Orville A.
WICHITA

Adams, Kilburn Elie, Jr.
Ainsworth, David
Allan, Thomas H.
Allen, Donald M.
Allen, William Odis, Jr.
Amstutz, Platte T., Jr.
Armstrong, Robert Clark
Barton, Jack M.
Baughman, George W.
Bear, Melvern Fred
Bell, Ruth Eleanor
Berg, John Robert
Bingman, Neal J.
Bowser, William F.
Bradley, Everett L.
Brodrick, William Morris
Brooks, Benton Snow, Jr.
Brown, Charles Spencer
Brown, Jack Harvey
Bruce, George H.
Buck, Loren I.
Carmody, Robert Arthur
Carpenter, E. Gail
Chasey, Kenneth LeMay
Chesney, Alvin E.
Chair, Joseph Robinson
Clark, James Edward
Clark, Norman Duane
Cline, Wilford L.
Cole, Virgil B.
Condon, James Carl
Cornell, Lee H.
Daniels, James I.
Davies, James Dudley
Davis, Horace Chesterfield
Earl, Will F.
Edens, Jack Cloyd
Edmiston, Elliott K.
Elder, James D.
Elledge, Emmett R.
Emmerich, Harry H.
Engstrand, Clinton
Evans, David LeCount
Fortier, Leo R.
Gardner, Jack Winston
Garlough, John L.
George, Robert Freeman
Gill, Robert J.
Hall, Roy H.
Harder, Robert P.
Hay, Lawrence C.
Heathman, Jack Hastings
Henderson, Walter D.
Herring, Frank
Holl, Frederick G.
Howell, William F.
Huffman, Edward Archibald
Jacques, Arthur N.
Jager, Eric Howard
Johns, Walter Wendell Schell
Johnston, John C.
Kathol, Gerald Joseph
Kessler, L. W.
Koester, Edward A.
Kretz, Robert Louis
Lamb, Ralph Charles
Lane, Joseph Howard, Jr.
Lehman, Roy P.
Lemmons, Jacob E.
Lenderman, Shirley Edmands
Lewis, Frank E.
Lillibridge, Frederick Stead
Low, Julian W.
MacQuown, William C., Jr.
Marshall, Frank Ellis
Maxwell, Eugene LeRoy
McCaul, Thomas M., Jr.
McCown, Clifton L.
McCracken, Earl
McHugh, William Ernest
McNeely, Robert B.
McNeil, Harold E.
Mercier, Vincent James
Moncrief, E. C.

Moody, Ray R.
Morgan, L. C.
Morgan, Lindsey G.
Morris, James David
Oburn, Richard Charles
Oyster, Frank A.
Pattison, William Harold
Payne, Don W.
Peters, Theodore Clinton
Petta, Joseph B.
Phillbrick, Eugene P.
Phillips, Lee E., Jr.
Pierce, C. Brooks
Powell, Stephen Burdette
Powers, Delmer L.
Pratt, Ernest S.
Quesenberry, Alice Mildred
Ralstin, James Franklin
Redmon, Harold E.
Reiserer, Victor Fletcher
Roach, Clark Alexander
Roop, Charles W.
Schmidt, Walter Carl
Shannon, Sherril A.
Sharrick, Alfred Neeld
Smedley, Harold O.
Snevers, Gilbert Karstens
Smith, Donald Hoy
Smith, Millard Wesley
Snider, Clark Thomas
Speer, George Woodrow
Stotler, Raymond Tracy, Jr.
Talbot, W. G.
Todd, Carl
Tomlinson, Warren Edison
Tosher, High Harold
Utterback, Claude
Ver Wiebe, Walter A.
Vickery, Ward R.
Walcher, Wayne E.
Webb, Kenneth Wilson
Webb, Riemann Shaw
Whorton, Raymond A.
Woodman, Kermit Thomas
Woodward, Harold Robinson
Wright, Thomas Goodman

KENTUCKY

ALVATON
Selover, Joseph Britton
ASHLAND—Browning, Iley B.
Fisher, Frank Lynn, Jr.
Hunter, Coleman D.
Thomas, Ralph Nelson
BOWLING GREEN
Griffin, Judson Roy
GLASGOW—Preston, John Basil
HENDERSON
Stith, Sam Henry, Jr.
LEXINGTON
Dobrick, Edward G.
Freeman, Louise Barton
Jones, Daniel J.
McFarlan, Arthur Crane
Miles, Phil Middleton
White, Richard D.
LOUISVILLE
Dunbar, Clarence P.
Stouder, Ralph Eugene
OWENSBORO—Brown, J. Albert
Damon, Wallace
Hagan, Wallace Woodrow
Hupp, Robert Elmer
PRESTONSPRING
Jenkins, Philip
Young, David Marion
WINCHESTER—Borders, Allan

LOUISIANA

ALEXANDRIA
Neumb, Edwin Meats
AMITE—Becker, Herman Carroll
BATON ROUGE
Amuedo, Curtis Leyrer
Andersen, Harold V.
Chauviere, Arnold Charles

Cox, Herbert Mack
Cunningham, James Marvin
Fisk, Harold N.
Henson, Gurrie R.
Howe, Henry V.
Huner, John Jr.
Jones, Paul Hastings
LeBlanc, Rufus Joseph
Lyons, Percy Marvin
Manning, Lloyd R.
Monsoir, Edward
Morgan, James Plummer
Oakes, Ramsey LeBleu
Osank, Alec N.
Polk, Donald James K.
Poteet, Sybil
Romans, William Alexander
Russell, Richard Joel
Tator, Benjamin Almon
Wang, Kia-Kang
Weingast, Leo
Wilbert, Louis Joseph, Jr.
Wilkins, Edwin Lewis
CROWLEY—Bescher, Earl H., Jr.
DE RIDDER
Hundley, Mervin Richard
HAMMOND
Courtney, Edwin Allan
HARVEY—Allin, Philip Robert
Bigger, Morton, Jr.
Eskrigge, Tatham R.
Harkey, William Jarrott
HOUMA
Abbott, Robert Henry, Jr.
INDEPENDENCE
Ewbank, Norman Ware, Jr.
JEANERETTE
Moresi, Cyril Killian
LAFAYETTE
Bates, Fred Westernman
Bernard, Hugh Allen
Bornhauser, Max
Brier, Ervin Ernest
Copeland, Robert R., Jr.
Cornish, Lou G.
Davis, John Harvey
Franques, Howard Luckett
Kirkendall, James Stuart
Landry, Daniel Morgan
Lee, John Edward, Jr.
Miller, Albert Douglas
Mitchell, Mark William
Ross, E. McIver, Jr.
Sanders, John Robert
Schmitz, William Charles
Stein, Francis B.
Traupe, Lloyd Desmond
Wharton, Jay Bigelow, Jr.
LAKE CHARLES
Ashley, Richard Moore
Bruner, Frank Allison
Canada, William Richards
Choate, Bruce Murrow
Craig, Ross Walter
Doer, James B.
Elliott, Andrew C.
Fort, Ellsworth William
Hammer, Francis Merrick
Holekamp, Otto George
Hutchins, Robert Morris, Jr.
Jackson, Roy Othello
Latta, Lee Allen
Loring, Ralph Crapo
Mahoney, John Francis
May, George Nolan
McLendon, Dan Harvey
McRae, Asa Duncan
Minard, David Lee
Morrow, A. Lyndon
Neill, Wenzel Baker
Newland, Dee Edward
Say, Stanley R.
Smith, Frederick A.
Starkey, Caldwell
Story, Richard Franklin
Timm, Bert Clifford

Tipsword, Howard Lee
Van Cleave, Robert Franklin
Vincent, Mordele L., Jr.
LEESVILLE—Baker, John S.
MOSBORO
Crump, John Gillman Hanson
Fergus, Preston
Lea, Joseph William
McAuliffe, Gilbert C.
Powless, R. C.
Totten, Robert Briggs
MORGAN CITY
Johnson, Byron Kenneth
NATCHITOCHES
Hostetter, Harry Rudolph
NEW IBERIA
Payne, Carol Winthrop
NEW ORLEANS
Addison, Carl C.
Anderson, Payton Victor
Atwater, Gordon I.
Baxter, Ebert Moyer
Bay, Harry X.
Baysinger, Eugene M.
Becker, Ralph Edward
Bell, Douglas E.
Bennett, Robert Turner
Bowling, Leslie
Bremer, Bernhard E.
Bricker, John F.
Broughton, Martin Napoleon
Brown, Leonard Irving
Calahan, Luther Weldon
Courtney, Clyde Jasper
Cranall, Kenneth H.
Crosbie, James Morton
Daniel, Guy S.
DeBlieux, Charles
Denny, Cyril Clayton
Efinger, William Lloyd
Everett, Robert Walter, Jr.
Ferebee, D. M.
Gibbs, Byron Bennett
Gibson, Eugene Ashley
Goerner, Fred Stephen
Hackbarth, Robert Earle
Hadley, Wade H., Jr.
Harang, Jack Francis
Hickey, Harold N.
Hoover, J. Wilkinson
Howe, Ralph H.
Hudson, Joe Bailey
Jackson, James Roy, Jr.
Kerlin, Marcellus Leslie
Kilbourne, Lewis Perkins
Kipp, Earl Mathew
Koch, Heinrich Louis
Little, Sterling E.
Loomis, Frederic Brewster, Jr.
Mayer, Maurice Joseph, Jr.
McDonald, Stanley Matthews
Murray, Irvin Bernard, Jr.
Nichols, Ernest Turnley
Norton, Richard D.
O'Bannon, Prentice H.
Orchard, Paul Joseph
Patton, Jacob L.
Petersen, Harluf C.
Pfeiffer, David Henry
Pike, William S., Jr.
Poirier, Otto Arthur
Richardson, Felix Dorman
Richardson, H.
Robinson, Ernest Guy
Rose, Stanford Leland
Rossa, Theodore
Schall, Fred Muller, Jr.
Schneider, G. W.
Seashore, Paul T.
Shepherd, George Frederick
Simmons, Fred E., Jr.
Smith, Neal Johnstone
Steinmayer, R. A.
Storey, Joseph Burnette
Taylor, Ralph E.
Todd, James Hopkins

Turner, Francis Earl
 Utterback, Donald Desmond
 Ware, William Edmond
 White, William Harris
 Wilgus, Wallace LaFetra

PARADISE

Failing, William Earl

RUSTON

Laskey, G. E.
 Rowe, Ural A.

SHEVEEPORT

Aimer, James D.
 Alagood, Robert Benson
 Allison, A. F.
 Amsden, Edgar A.
 Arper, William B., Jr.
 Barret, William Morris
 Bartell, Laurence D.
 Barton, Louis A.
 Beck, Robert W.
 Beckman, Michael William
 Berg, John Nelson
 Blanchard, J. B.
 Blanpied, B. W.
 Bloomer, Philip Arthur, Jr.
 Borden, S. P.
 Brockway, E. R.
 Brookings, Henry Nason Kinney
 Bryan, Carl L.
 Buchner, Harry M.
 Burch, Earl Marvin
 Cameron, Louis Gerin
 Caster, Ernil Leslie
 Chapman, Richard Thomas
 Clark, Charles Chester
 Clark, Chester C.
 Clark, Samuel L., Jr.
 Clark, Willis Kenley
 Cochran, Phil K.
 Corbin, Milton Wallace
 Cowan, Clifton A.
 Cox, Alcott B., Jr.
 Crow, Louis Milton
 Davis, Gene O.
 Drindal, Joseph Thomas
 Eaves, Everett
 Eisenstatt, Phillip
 Fahle, Paul Bartlett
 Finch, Kenneth Day
 Fischer, LeRoy Fred
 Forgetson, James M.
 Fowler, Henry Florey
 Fowler, Virginia Tolbert
 Frazell, William Davis
 Freed, Richard
 Gibson, Worth C., Jr.
 Gilbert, A. C., Jr.
 Goebel, Lawrence A.
 Grage, Victor P.
 Grigsby, Garland Oakes
 Hamilton, Walter Frederick
 Hanes, Vincent Eugene
 Harlowe, Leslie S.
 Hazzard, Roy T.
 Hickcox, Charles Atwood
 Howard, George Carl
 Hunter, James W.
 Hutson, E. B.
 Jackson, Alvin M.
 Jenkins, George Marvin
 Johnson, George Norris
 Kamb, Hugo R.
 Kimball, Edgar W.
 Kneeder, Elmer Paul
 Lincoln, William Wilkinson
 Lytle, J. Edward
 Magale, John F.
 Marshall, Walter Hill
 Mayeaux, James Raymond
 McCall, Charles Louis
 McMahon, Joe Trees
 Meltzer, Lee Hillard
 Miller, Norman Clark
 Mix, Adrian Elroy
 Mix, Sidney E.

Moffatt, Robert J.
 Moody, Clarence L.
 Moore, William Willard, Jr.
 Morris, James Howard
 Murdoch, Ernest John
 Ogden, Roger Hadfield
 Ogier, Edwin Putman
 Osmont, Frank Carter
 Parmelee, Edward Bruce
 Pearce, Roy Ward
 Petersen, Morton Ovistgaard
 Philpott, Thomas Hughes
 Piggott, Guido M., Jr.
 Plaster, William M.
 Purzer, Joseph
 Quackenbush, William Moore
 Ranney, William Elliot
 Robinson, Van Daniel
 Rosenkrans, Robert Russell
 Rukas, Justin Matthew
 Safonov, Anatole
 Schwartz, Channing Beryl
 Scott, Edward W.
 Seedle, Charles William
 Shamblin, William Earle
 Simkins, J. J.
 Sloan, William Wesley, Jr.
 Spears, Walter H.
 Spofford, Howard N.
 Spooner, W. C.
 Stephenson, Cuthbert D.
 Stevens, George R.
 Sullivan, Richard Burl, Jr.
 Summerill, Barbara Ann
 Tash, George E.
 Thomas, George Dewey
 Tilieux, Harry Oscar
 Tyson, John Edward
 Valerius, Claude N.
 Vernon, Benton R.
 Wade, Rolla Theodore
 Wagoner, George E.
 Walker, James Edward
 Wallace, William Edwin, Jr.
 Ward, J. H. E.
 Watson, John Gaul
 Wells, Loyal H.
 Wells, William Matthew
 Wender, W. G.
 White, Morris Barksdal
 Whitwell, E. V.
 Williams, John Raynesford
 Wilson, Richard M.
 Womack, Brame
 Woodward, Truman Pendleton
 Young, Jackson S.
 Zoller, Victor Hubert

SULPHUR

Baumgarten, Frederick A., Jr.
 Farley, William Richard
 Iles, George G., Jr.
 Moore, James A.
 Reynolds, Junior Lee
 Whately, James Moulton

MARYLAND

BALTIMORE

Cobban, William Aubrey
 Dorsey, Geo. Edwin
 Hall, Edward Abbott
 Singewald, Joseph T., Jr.
 Vokes, Harold Ernest
 CHEVY CHASE—Darton, N. H.
 Mendenhall, Walter C.
 DARLINGTON—Iddings, Arthur

MASSACHUSETTS

BELMONT

Curtis, Bruce Franklin
 BOSTON—Haskell, Norman A.
 Le Croix, Morris F.
 Willard, Max Emery

CAMBRIDGE

Billings, Marland Pratt
 Cloud, Preston E., Jr.
 Goodman, Clark
 Mather, Kirtley F.
 Shrock, Robert Rakes
 Vine, James David
 Whitehead, W. L.
 LINCOLN—Beers, Roland F.
 Tripp, Russell Maurice
 MEDFORD—Lane, Alfred C.
 NEWTON
 Butcher, William Sherman
 Morgan, Charles Gill

NORTHAMPTON

Kierstead, Caroline Ella H.
 Meyerhoff, Howard Augustus
 Shaub, Benjamin Martin
 SHARON—Cushman, Joseph A.
 SPRINGFIELD
 Robinson, Joseph
 WELLESLEY—Parhiala, Leimo I.
 WILLIAMSTOWN
 Foster, Paul Woodward

MICHIGAN

ADRIAN—Foster, Helen Laura
 ALLEGAN
 Walsworth, Kenneth G.
 ANN ARBOR—Belknap, Ralph L.
 Buckwalter, Tracy V., Jr.
 Cohee, George V.
 Eardley, Armand John
 Ehlers, George Marion
 Honkala, Fred Saul
 Hussey, Russell Claudius
 Kelum, Lewis B.
 Landes, Kenneth Knight
 CASSOPOLIS
 Bishop, Margaret Stearns
 CEDARVILLE
 Hannum, Robert Charles
 CLARE—Cook, Everett Earl
 DETROIT—Sanford, John Theron
 EAST LANSING—Boyd, Harold W.
 Kelly, William Aulin
 Vance, Thaddeus Blair
 GRAND RAPIDS
 Jodry, Richard Louis
 Knipe, Ralph E.
 Newcombe, Robert J. B.
 Smith, Robert Harlow
 Vary, John A.
 Weaver, Thomas James
 IRON RIVER—Clark, Lorin D.
 JACKSON—Gentry, Howard L.
 LANSING—de Cousser, Kurt H.
 Eddy, Gerald Ernest
 Grant, Rex Potter
 Martin, Helen M.

MIDLAND

Alquist, Francis Nelson
 Mt. PLEASANT
 Branson, Edwin Robert
 Brown, William F.
 Chapman, Guy Edgar
 Hubman, Ralph Gordon
 Hunt, Raymond S.
 Kristofferson, Ole Herman
 Lewis, John Porter
 Osgood, Manley, Jr.
 Planteroth, Raymond Oscar
 Schulz, William M.
 Sleight, Glenn C.
 Stevens, Norman Robert
 Wolcott, Richard Hastings

MUSKEGON

Crider, Hugh Dixon
 PLEASANT RIDGE
 Richards, Edith Jean
 SAGINAW

Baltusaitis, Edward Joseph
 Clark, Charles Koogle
 Gravelle, Kenneth Allen
 Rose, Charles Grant

MINNESOTA

AURORA
 Conwell, Cleland Neep
 AUSTIN—Rush, Richard W.
 Wilson, Charles Lewis
 EMBELSOR
 Wilson, Ruth Blanchard
 MINNEAPOLIS
 Donovan, Percy W.
 Emmons, William H.
 Langenheim, Ralph Louis, Jr.
 Swain, Frederick Morrill
 Thiel, George Alfred
 ST. PAUL—Carlton, Jane T.
 ST. PETER—Johnson, Chester O.

MISSISSIPPI

BROOKHAVEN
 Culligan, Leland Bowen
 Levorsen, Robert Irving
 Womack, Robert, Jr.
 COLUMBIA
 Calvert, Mont Granderson, Jr.
 Haigrove, Marvin Ellis
 HATTIESBURG
 Lewis, Paul S.
 HAZLEHURST
 Bristley, Leon Prestridge, Jr.

JACKSON

Alexander, Clyde Wayne
 Allen, Bryant W.
 Ayres, Lewis Grant
 Bailey, Clarence G.
 Baillie, Wilfred
 Blanchard, Frank N., Jr.
 Bleakley, Alfred Bishop
 Braunslein, Jules
 Brown, John Lovelace
 Buck, Charles E.
 Clark, James Tate
 Copeland, Richard G.
 Deuth, Martin John
 Devlin, Frank
 Finrock, Lawrence Johnson
 Garst, Jarvis
 Gosnell, George Edward
 Grubb, Carl F.
 Guest, Henry Grady
 Hansen, Malcolm B.
 Harrell, David C.
 Harris, R. Merrill
 Herring, Donald Grant, Jr.
 Holden, Frederick Thompson
 Jeffreys, Geoffrey
 Kennedy, John B.
 Klovstad, Julie Anne
 Knight, Wilbur Hall
 Leonard, John Reeves
 McCarver, Alfred Gerald
 McCasland, Barney Clifton
 McFarland, L. R.
 Meagher, David Pope
 Mellen, Frederic Francis
 Michael, James F.
 Monsour, Eli T.
 Morgan, Cecil L.
 Morton, Robert Brading
 Murphy, Boyd Ferguson
 Murray, Grover E.
 Norman, M. E.
 Pavlovic, Robert
 Payne, Willard M.
 Perry, Waynard Burton
 Priddy, Richard Randall
 Punchard, Richard Knapp
 Reese, Donald M.
 Rice, Elmer M.
 Schmidt, Karl A.
 Schmotzer, Julius William
 Scrugs, Maurice Dale
 Sherwin, Melville William
 Siberts, Earl Edwin
 Smith, Claude Dinkins
 Spooner, Knight Keith
 Sprague, Robert D.

- Sternberg, Charles William
Talley, Gilbert Arthur
Thomas, Emil Paul
Thompson, John P.
Toler, Henry N.
Trueheart, Robert Thomas
Uri, Joseph John
Weltman, Louis H.
Wilson, Fuller Hugh
Winzler, Alvin Raymond
- LAUREL**
Carter, Keegan
Green, George Gardiner
Hughes, Urban B.
Lanier, Joseph Richard
Manger, G. Edward
McClouthin, Tom
Otts, James Allen, Jr.
Yoder, George M.
- MERIDIAN**
Hendy, William James, Jr.
- NATCHEZ**
Gulmon, Gordon Wesley
Johns, Nooe William
- STATE COLLEGE**
Passel, Charles G.
- UNIVERSITY—Morse, William C.**
- MISSOURI**
COLUMBIA—Branson, E. B.
Keller, Walter David
Mehl, M. G.
Peck, Raymond E.
Unklesbay, Athel G.
- FAIRFAX—Portis, Richard Wayne**
- FERGUSON**
Echols, Dorothy Jung
Joplin—Fowler, George M.
KANSAS CITY—Bailey, Lester
Ball, John Rice
Brown, Robert Wesley
Burt, Roy A.
Lee, Marvin
- PLATTE CITY**
Abbey, Gerald Ellsworth
ROLLA—Anderson, Keith Elliott
Cowie, Roger Harrison
Forrester, James Donald
Graser, Frederick Arthur
Greene, Frank C.
McNeal, Robert Paul
Muilenburg, Garrett A.
- SPRINGFIELD**
Ostrander, Allen Roys
- St. LOUIS**
Brazil, James Joseph
Gross, Henry Emmett
Hinchey, Norman Shreve
Petsoff, George Jordan, Jr.
Stearn, Noel H.
Werner, Harry Jay
- WEBSTER GROVES**
Shaffer, Nancy Ruth
- MONTANA**
BILLINGS—Berg, Karl A. E.
Cronin, K. Stewart
Dockery, Willard Lyle
Fellows, Robert Arthur
Fulton, Loris J.
Hudley, Herbert David
Hornung, Arthur C.
Hudgens, Clyde O.
Jenkins, Page T.
Marshall, Jesse William
Shay, D. C.
Thurman, Franklin A.
Turpin, Evelyn Marie
- Butte—Robertson, Forbes Smith**
- CONRAD**
Emrick, Eggleston Byers
- CUT BANK**
Goodell, Horace Nelson
Hupp, John Ervin
McCourt, James H.
- Sullivan, Albert Martin
Swartz, Joseph
- GREAT FALLS**
Alpha, Andrew G.
Bateman, Andrew Frank, Jr.
Chamberlain, Virgil Ralph
Erdmann, Charles E.
Nordquist, Jack Warren
Peden, William M.
- MISSOULA—Nash, Howard F.**
SHELLEY—Blist, John Elmer
Kilbourne, Deane Earle
Soper, Emmet Harland
- NEBRASKA**
AGATE—Cook, Harold J.
LINCOLN—Elias, Maxim K.
Folger, Anthony
Lugn, Alvin Leonard
Reed, Eugene C.
Scherer, Oliver J.
Schramm, E. Frank
Waring, Gerald A.
- OMAHA—Johnston, Floyd T.**
- NEVADA**
BOULDER CITY
Felts, Wayne Moore
CARSON CITY—Loel, Wayne
RENO—Cree, Allan
- NEW JERSEY**
FORT MONMOUTH
Johnson, Edward William
- FRANKLIN**
Williams, William Paul
- NEW BRUNSWICK**
NEWARK—Bates, Robert Latimer
Bowles, Edgar Oliver
Hayes, Albert O.
Martens, James H. C.
McCampbell, John Caldwell
- PRINCETON**
Fox, Steven Knowlton
Maxwell, John Crawford
Sampson, Edward
Sims, Paul Kibler
Thom, W. T., Jr.
Van Houten, Franklin B.
Wilsey, James Arthur, Jr.
Woollard, George Prior
- SUMMIT—Pardo, Georges**
- NEW MEXICO**
ALBUQUERQUE
Bradish, Beverly B.
Freeman, John Clark
Graham, La Rue Dennis
Hall, Ellis A.
Hemenway, George A.
Hoover, William B.
Johnson, Carlyle D.
Kelley, Vincent C.
Murphy, Robert Emmett
Ryan, Thomas Patrick
Umback, Paul Henry
Wengender, Sherman Alexander
Zapp, Alfred Dexter
- ARTESIA**
Austin, Charles Albert, Jr.
Branson, William B.
Broomfield, R. A., Jr.
Lamb, Noel Raymond
Scott, Wilson Elgie
Sheldon, Vilas P.
Yates, Harvey Emmons
- ATZEC—Silver, Caswell**
BENNETT—Baer, Daurice Frank
- CARLSBAD**
Frenzel, Hugh N.
Goodman, Herbert Maynard
Harley, G. Townsend
Huffington, Roy Michael
Hurlbut, Elvin Millard, Jr.
King, Ralph Hughes
- Lorenz, Edmund Groff
Pratt, Wallace E.
Riggs, George D.
Tennant, Robert Hudson
Wills, Neil H.
- FARMINGTON**
Davis, Wesley Edward
Harding, Robert Nelson
Julander, Weldon C.
McConnell, Andrew Pollock
Raman, Norman Dean
Wilson, Eugene England
- HOBBS—Boss, Reuel Lee**
Cahill, Edgar D.
Decker, Edith Marguerite B.
Holmes, S. W.
Madera, Fred
Miller, Charles Parmer
Moore, Joe Hiram
Petch, Arthur H.
Sands, Charles Dudley
Staley, C. Glenn
- JALISCO**
JALISCO
Culbert, James Irving
- LOCO HILLS**
Krouskop, Norman Wallace
- MONUMENT**
Snider, James Wilson
- ROSWELL**
Barnett, John Abner
Cave, Harold Sergius
Crandall, Roderic
Foley, Edward J.
Hanson, Ernest Albin
Headley, Joseph B.
Holt, Richard Dexter
Hruby, Milton
Kelly, John Martin
Moore, Fred Holmsley
Peterson, Victor Edwin
Stipp, Thomas F.
Turner, Thomas Edward
- SANTA FE**
Spurrier, Richard Ross
- SILVER CITY**
Wadsworth, Albert Hodges, Jr.
SOCORBO—Northup, Richard Cox
Vorbe, Georges
- NEW YORK**
ALBANY—Myers, Clay Kenton
BRONXVILLE—Naramore, Chester
- BROOKLYN**
Chenoweth, Philip Andrew
BUFFALO—Reves, John R.
- DOUGLSTON, L. I.**
Thompson, Lester S.
- ENDICOTT—Bartle, Glenn G.**
HAMILTON—Childs, Orlo E.
- ITHACA—Harris, Gilbert D.**
Nevin, Charles M.
Palmer, Katherine V. W.
Rice, Heinrich
Smith, Ernest Rice
- NEW YORK**
Adams, Clyde B.
Akers, Wilburn Holt
Aldrich, Henry R.
Baird, Chester A.
Baker, Norval E.
Baker, Raymond F.
Bartlett, Fred W.
Behre, Charles H., Jr.
Beltz, Edward William
Bleeker, Edward S.
Boardman, Robert Leland
Brice, John W.
Brokaw, Albert D.
Burnett, Jerome B.
Bush, Frederic A.
Case, William B.
Chapin, Theodore
Christie, Laurence G.
Chronic, Byron John, Jr.
- Cobb, Margaret C.
Condit, D. Dale
Coryell, Horace N.
Cotner, Victor
Cox, Wesley Philip
Crum, Harry E.
Curtice, Arthur A.
Dixon, A. Faison
Drake, Nels D'Arcy
Dresser, Myron A.
Eagles, Homer M.
Ellis, Brooks Fleming
Eastabrook, Edward L.
Fath, A. E.
Gallagher, John Patrick
Galloway, Alan James
Garnjost, Frederick W.
Garwood, Roland William
Greig, Douglas A.
Grove, Brandon Hambricht
Gwinn, James William
Hake, Benjamin F.
Hamilton, Charles W.
Hawley, Luther David
Heworth, Alfred John
Haynes, Winthrop P.
Hedberg, Hollis D.
Herold, John Sublett
Heston, J. Ed
Hill, Kenneth E.
Hindes, E. P.
Holman, Eugene
Humphrey, William Elliott
Jablonski, Eugene
Jones, Verner Everett
Kalb, John L.
Kaufmann, Godfrey F.
Kay, Marshall
King, Robert E.
Kinney, Harry D.
Knelei, G. Moses
Knutson, Clarence J.
Kraft, Philip
Langlois, Alice
Larkin, John Jennings, Jr.
Leibensperger, Raymond
Lilly, Ernest R.
Link, Walter K.
Lovejoy, John M.
McCobb, Harry Wendell
McCulloch, Joseph P.
McKee, H. Harper
McQueen, Henry S.
Messina, Angelina Rose
Millard, William J.
Miller, William Dana
Milstein, M.
Mohr, Clifford L.
Moore, Thomas Verner
Moulton, Gail F.
Neal, Earl Seaton
Newell, Norman D.
Newhouse, Lester
Notestein, Frank B.
Olson, Walter S.
Paige, Sidney
Pertusio, Serge M.
Peterson, Jahn Jean
Pogue, Joseph E.
Pyre, Augustin
Redfield, John S.
Reed, Lyman C.
Rieber, Frank
Roberts, Thomas G.
Rohrer, George H.
Schwennessen, Alvin T.
Seager, Oramel Ainsworth
Sealey, Frank C.
Sherman, Roger H.
Skeels, Dorr Covell
Small, Walt Madison
Spangler, Walter Blue
St. Clair, Stuart
Strock, Lester William
Suman, John R.

Taylor, M. Hall
Townsend, Rex M.
Vajk, Raoul
van der Linden, B. H.
Van Norden, Peter John
von Estorff, Fritz E.
Walters, Ray P.
Wasson, Harold J.
Weeks, Lewis G.
West, Donald Milton
Whetsel, Raymond Victor
White, Kessack D.
Whiton, Herman F.
Winkler, Bruno Oscar
Za'oioco, Basil B.

POUGHKEEPSIE

Warthin, Aldred S., Jr.

ROCHESTER

Fischer, Alfred George
Jenks, William Furness

SCHENECTADY

Brooks, Barbara Ellen
Rhodes, Edward J.

SYRACUSE—Aptel, Earl T.

WALDEN

Wilkinson, Frances Tuttle

WELLSVILLE

Whorton, Chester D.
Young, Wilber H.

NORTH CAROLINA

CHAPEL HILL

Huddle, John Warfield
Stillwell, James Henry

DURHAM—Berry, Edward Willard

KINSTON—Stamey, Roderick A.

RALEIGH

Hayes, William C., Jr.

WILMINGTON

Riggs, William Adams

NORTH DAKOTA

FARGO—Pye, Willard D.

GRAND FORKS

Grossman, Irving
Laird, Wilson Morrow

OHIO

AKRON—Miles, Daniel John

CINCINNATI

Caster, Kenneth E.
Rich, John L.

RITTENHOUSE, Gordon

CLEVELAND

Bacon, Charles S., Jr.
Donner, Henry Frederick

Johnson, Walter
McCloy, Walter Lowrie, Jr.

Robinson, J. French
Smoots, John P.

CLIFTON

McCullough, A. Stafford

COLUMBUS

Anderson, Richard Jasper
Cottingham, Kenneth

Lockett, J. R.
Melvin, John Harper

Norling, Donald L.
Ring, Dewitt T.

Spieker, Edmund M.
Summerson, Charles Henry

DELAWARE

Crowl, George Henry

FINDLAY—Berwald, W. B.
Donnell, James C., II

Dumbros, Nicholas George
Emery, Wilson B.

Funk, Fred J.
Noble, Gilbert W.

O'Brien, Francis Eugene
Shade, E. Bruce

Thomas, George Terrell
White, Stanley Battershill

LIMA—MacDonell, James A.

NEWARK—Sanger, Willard A.

Sparks, Jackson Bennett

NORTH CANTON

Wise, Richard Atlee

OAK HARBOR

Duff, Margaret Ellen

STUEBENVILLE

Reed, George Alver

TOLEDO

Applegate, Margaret Jayne
Campbell, Lois Jeannette

Lindberg, George David

OKLAHOMA

ADA—Barcklow, John Calvin

Bonifield, Henry Lease

Jones, Boone
Rixleben, Bruno

Witherspoon, Edgar

ANADARKO

Hannon, Norbert Michael, Jr.

McNally, Perry Michael

ARMORE—Callahan, Drury V.

Clove, Charles E.

Ell, Harold B.

Hannum, Connelly Edgar

Harris, John Rodefer

Hicks, Ira Curtis

Johnson, William R.

Kendall, Richard G.

Ketterer, Walter Philip

Miller, Charles A., Jr.

Neighbor, Frank

Neustadt, Walter, Jr.

Nichols, Herman E., Jr.

Reavis, George David

Schweers, Frederick Paul

Tomlinson, Charles W.

Westheimer, Jerome M.

Westmoreland, Earl

White, Maynard P.

Williams, Meryl Dedrick

BARTLESVILLE

Absher, William F.

Alexander, George Watrous

Ambrose, A. W.

Baldwin, Harry L., Jr.

Bartram, Paul L.

Bradley, Richard Morris

Brasted, Fred

Brookby, Harry Dudley

Charles, Homer H.

Clark, Robert P.

Courtier, William H.

Dietert, Arthur E.

Elliott, George R.

Erickson, Arthur R.

Ericson, Harry Berkeley

Ferguson, John Inger

Given, Robert Jennings

Graham, B. L.

Guinn, Delmar R.

Harper, Paul Ashton

Hier, Charles Douglas

Hinzer, Alma Jones

Izenberger, Nate P.

Jones, Daniel John

Kidd, Robert L.

Lounsbury, D. E.

Mallory, William Wyman

Miller, Vincent

Moss, Rycroft G.

Murphy, P. C.

Nicola, Oliver Peter, Jr.

Owen, Herman J.

Redman, Kenneth George

Reid, Robert P.

Sands, J. M.

Stewart, Patricia Allen

Stucky, Zenas E.

Sutherland, Pat Kennedy

Thompson, Edwin Ivor

Van Dali, John E.

Weeks, Warren B.

Weirich, T. E.

Wells, Murray J.

Wilhelm, Arthur K.

Wood, Alexander Wayne

Wynne, Hal C.

BIXBY—Cumming, Alfred

BRISTOW

Cantrell, Peggy Francis P.

CHANDLER—Wagner, J. Basil

CHICKASAW

Becker, Robert More

Bryan, John Victor

Fee, Samuel Thomas

Langford, Eldon Woodrow

Langford, Lucille E. T.

Muir, J. Lawrence

Reedy, Harold J.

Worrell, Frank Hansen

CLINTON—Boring, Burl J.

COWETA—Vernon, I. J.

CUSHING—Stump, Mark Eugene

DUNCAN

Caswell, Charles Alfred

Clark, Roswell Dale

Day, Clyde E.

Gouin, Frank

Hardy, Roy P.

Hogan, William Roy, Jr.

Huff, Jack Newton

Montgomery, Phil C.

Putnam, Darrell M.

Reynolds, Jordan K.

Smalley, Claire F.

Tapner, Wilfred Bonno

EDMOND—Jones, Leland W.

Miller, Harry A.

EL RENO—Gibbs, Kenneth Edgar

ENID—Clifton, R. L.

Ford, Carl S.

Lillibridge, Harry E.

Maxey, James Roy

Neiler, William Dixon

FORT SILL

Coleman, Hubert Paul

GUYNOM—Cruce, John D.

Kautz, Archie R.

HENRYETTA—Morris, Walter W.

HOLDENVILLE

Minahan, James Leo

HOOKEE—Esterak, Leroy

KETCHUM—Tandy, J. Hiram

LINDSAY

Chesney, Robert William

MADILL—Brillhart, Norman W.

MARIETTA

McCall, John Edmund

MARLOW—Ervin, Lynn Delbert

MAYSVILLE—Browning, Chloe A.

NASH—Wethington, William O.

NELSON—Bryan, Frank

NORMAN

Brandenburg, Robert Fairchild

Chase, Gerald Warren

Cloud, Wilbur F.

Davis, Leon Virgil

Decker, Charles E.

Disney, Ralph Willard

Dott, Robert H.

Fox, Frederick Glenn

Frederickson, Edward Arthur

Gould, Charles N.

Ham, William Eugene

Harris, Reginald Wilson

Huffman, George G.

Hussey, Keith Morgan

Jacobsen, Clyone Lynn

King, Ted Richard

Lucas, Elmer Lawrence

McCulloch, George Glenn

McNutt, Gordon Russell

Melton, Frank Armon

Monnett, V. Elvert

Moore, Carl Allphin

Oakes, Malcolm C.

Polk, Thomas Robb

Taylor, Jack Allen

Warren, John Henry

Webb, John Hanor

Yee, Bing Quai

OKLAHOMA CITY

Abbott, Wayne Rosser

Anderson, Carl T.

Atkinson, William H.

Baldwin, Benjamin Franklin

Bale, Hubert E.

Ballard, William Norval

Barlow, Macrlant M.

Becker, Theodore G.

Beebe, B. W.

Biggart, Robert William

Billings, Sam Glen

Bolyard, Garrett L.

Boyle, James Philip, Jr.

Brauchli, Rud W.

Brewer, John Edward

Brown, H. Travis

Brown, Vergil Neal

Bunte, Arnold S.

Burress, George Howard

Butcher, Seldon D.

Buttram, Frank

Calvert, Warren Lytle

Camp, Richard W.

Carpenter, M. E.

Carrier, John B.

Carver, George E., Jr.

Clark, Charles R.

Clark, Robey H.

Clinkscales, Albert S.

Coleman, Tom L.

Conkling, R. A.

Cooper, C. Harrison

Costa, Delbert James

Crockett, Harry Lee

Curtis, Lawrence Willford

Dahlgren, Elmer George

Dannenberg, R. M.

Decker, Willis Mansfield

Detmar, Arthur Owens

Dewey, Robert Flanders

Dorr, Clyde H.

Downing, Roswell B.

Dunn, George V.

Earle, Francis, Jr.

Edmund, Rudolph William

Eley, Jack Burt

Ellison, Kenneth A.

Engleman, Rolf

Everett, Rizer

Faust, Josef

Fillmore, Ralph L.

Frizzell, Mildred V. Armor

Galbraith, Lyman Edgar

Galloway, George Harold

Garrett, Robert J.

Glover, Robert Howard

Goudy, Louis Willard

Green, Thomas Henning

Hadler, Harry George

Hamilton, Clarence Edgar

- Kate, Frederick Henry
Keeler, Clifton M.
Keller, Kenneth F.
Kerns, Floyd G.
Kister, Herbert H.
Kite, William C.
Kleen, Harold J.
Koch, Thomas W.
Kornfeld, Sam
Laughbaum, Graydon Howard
Laughlin, Roland W.
Lindner, Joseph Leicht
Maddox, Gerald C.
Maples, Steve Campbell
Maravich, Milan D.
McAninch, Roy David
McBee, William Dalton, Jr.
McGee, D. A.
McKinley, Glenn Ernest
McMurtry, Wilbur Earl
Metcalfe, Myron C.
Miller, Willard L.
Mitchell, Robert Oliphant
Montgomery, A. J.
Morales, Gilberto Garcia
Moreman, Walter L.
Mull, J. A., Jr.
Newby, Jerry B.
Nichols, Paul B.
Norville, Glen S.
Nuckolls, William Carlisle
Obern, D. W.
O'Keefe, Hugh W.
Owen, Elwyn Ronald
Owens, John Edward
Pasquella, George Graham
Perrine, Irving
Pillard, Robert T.
Price, Edgar William
Ramsey, Charles E.
Richards, A. Howard
Richards, J. T.
Riise, John Andersen, Jr.
Roberts, Richard Lee
Rumsey, Edward W.
Schempf, Foster John
Sears, Joseph McHutchon
Selk, Erwin L.
Shields, Fred C.
Simmons, Kenneth A.
Smith, Robert Maurice
Stiles, Aden Edmund
Stones, James Eugene
Stratton, J. Lynn
Strothmann, Frederick Henry
Suffield, Harry Franklin
Sullivan, Chris Rice
Swesnik, Robert Malcolm
Swirczynski, Richard Paul
Taber, Edward Carroll, Jr.
Taylor, Charles H.
Taylor, Victor Jean
Thomas, Murreli D.
Thomas, Norman L.
Turk, Lon B.
Trombla, Lynn Burdeaux
Unger, Edwin Harold
Wallace, Louis Stacy
Wallace, P. A.
Ward, Roland Van
Ware, John McKee
Weinta, Clement A.
Wellman, Dean C.
Wheeler, Joseph Bowen
Wheeler, Robert Reid
Williams, George O.
Wilshire, L. M.
Wilson, Louis R.
Wimbish, Forrest E.
Wolff, Deane J.
Wolverton, Harold A.
Woodward, George Edward, Jr.
Wynn, Warren H.
Yoakam, Cole A.
- OKMULGEE
Wise, James Sharples
PAULS VALLEY
Cashin, Richard Carl
Cast, Richard Frederick
PONCA CITY—Athy, Lawrence F.
Boyd, W. Baxter
Clark, Glenn C.
Clark, Stuart K.
Hunter, Robert E. Lee
Hurd, Harry Hathaway
Iversen, William G.
McCullum, Leonard F.
Messman, Roger Lawrence
Mills, R. van A.
Morgan, D. M.
Parker, Everett C.
Petersen, William Arthur
Prescott, Harold Raymond
Royds, James Stanfield
PRAGUE
Klabzuba, Robert Ernest
PURCELL—Blanchard, W. Grant
Butler, Robert James
Liming, John A.
SAPULPA—Brehm, Ralph C.
Cartmell, William Martin
SEMINOLE—Runyan, E. L.
Smith, Frederick James
SAWNEE—Artman, George W.
Brown, Robert
Buck, Richard D.
Burke, Doyle Michael
Campo, Henry Andrew
Carpenter, Everett
Cassingham, Robert L.
Damon, Frederic Thomas
Darnall, Clint Adrian
Davies, Jack W.
Dawson, Edwin A.
DeLong, James Alfred
Ditsworth, Glenn William
Gahring, William Ross
Graham, Will Lee
Hoyle, Charles R.
Kelly, Elmo Lee
Meyer, Arthur M.
Mousley, Virginia Marcelle
Quiett, Roy C.
Rase, Henry Leonhard, Jr.
Rau, Harold L.
Smith, Delbert Franklin
Teichman, Joseph Bernard
Tyler, Henry Johnson
STILLWATER—Corrigan, Glen Lee
Ellison, Charles W.
Monnett, Victor Brown
Six, Ray L.
Stocking, Hobart Ebey
Tarver, Earl A.
SULPHUR
Cross, Margaret Alice Tribble
TULSA—Ackers, A. L.
Adams, W. C.
Albert, Emil Richard, Jr.
Allen, Fraser Hall
Anderson, Tom A.
Andrews, Harry Hugh
Armstrong, William Burrus
Arnold, Henry C.
Austin, Arthur Cecil
Bace, A. C.
Bailey, Willard F.
Balbin, Paul Davet
Ballou, Albert Lorenzo
Banister, Richard Carl
Barrett, Lynn Wandell
Barthelme, Albert J.
Bartlett, Dewey Follett
Bartram, John G.
Bates, Robert Paul
Baum, Robert
Beck, Elfred
Beckley, Albert L.
Bennett, Frank Orville
Benson, Morris H.
Bernard, W. E.
Berry, Harry Louis
Bevan, Thomas Judson
Bickel, Harold Clayton
Bird, Stuart Frederick
Bishop, Francis Luther
Bloesch, Edward
Bohart, Philip H.
Born, William Theodore
Boyd, Lewis Henry
Brant, Ralph A.
Brown, Frank E.
Brown, Henry Wilder
Brown, Merritt H.
Bryant, Howard S.
Bullard, Edgar F.
Burditt, Marvin Reece
Burke, William Henry
Busch, Daniel Adolph
Butt, William Horace
Campbell, Francis Faulkner
Carlson, Charles G.
Carter, Roland White
Case, Leslie C.
Caylor, Garth William
Chapman, Martin Edward
Christenson, Alton Carl
Clark, Frank Rinker
Clark, Howard
Clark, Joseph Marsh
Clark, L. W.
Clarke, Ralph L.
Clayton, Neal
Clote, Thomas Anthony
Coffin, R. Clare
Collins, Jack Beverly
Conhain, Howard J.
Copass, Jack M.
Cornelius, Lee Henri
Coryn, F. R.
Crain, John Richard
Cruse, John S., Jr.
Cullen, Ronald J.
Davis, Sidney Hugh
Dawson, William Aubrey
Deegan, Charles J.
Deisenroth, Malcolm, Jr.
Denison, A. Rodger
Devin, Fred A.
Dickey, Parke A.
Dillard, W. Reese
Dille, Glenn Scott
Eckenswiler, Cleo W.
Egan, John A.
Eirich, Constance G.
Ellis, John Reese
Ellsworth, Elmer William
Elson, William H.
Emrick, D. G.
Evans, Noel
Eyler, Albert Taylor, Jr.
Feagin, Barney, Jr.
Ferguson, John L.
Ferris, Craig
Finley, Jean Carson
Fitts, L. E., Jr.
Fitzgerald, Paul E.
Frossard, Robert L.
Frost, Victor LeRoy
Fruehling, Siegfried William
Fuller, Melville Weston
Galley, John E.
Gardner, James H.
Gartner, James L.
Gawthrop, R. M.
Gibson, George Drew
Gilbert, Thomas Harold
Gilkison, Don
Gill, Joseph Powers
Gilmour, Andrew
Giltinan, George Murray
Ginter, Roy LaMont
Gish, Wesley G.
Glass, Wilson Vernon
Goodrich, Willard Dale
Graeber, Clyde P.
Green, William Gladstone
Griffith, Glenn R. V.
Grigsby, R. B.
Griley, Horace L.
Grimm, George A.
Gulley, Vernon E.
Guthrey, William Morris
Hall, Dollie Radler
Hamilton, Robert G.
Handley, Ernest Jack
Harilton, Bruce H.
Harris, Seward F.
Hart, Raymond M.
Harvey, Castle J. C.
Hatcher, Oscar
Hawes, Julian
Hawkins, Allen Gentry
Hawkins, Glenn D.
Hemmett, Jean W.
Hengst, Jess H.
Henry, William Wirt
Hewett, Charles Francis
Hill, Orval Hall
Hoffmeister, William S.
Hoke, T. C.
Holston, Alvin Arthur
Hoover, James B.
Hoover, W. Farrin
Hopper, Walter E.
Horkey, William E.
Horner, William L.
Hosterman, John F.
Houghton, Herbert Moore
Howard, Dan O.
Howell, Jesse V.
Hower, S. Grace
Hughes, Richard
Hull, Joseph P. D.
Hunt, Lenora May
Hurty, Clare Nelson
Hurtinson, Edward Allen
Inkster, John W.
Innes, Arland Irving
Jameson, Paul Marvin
Johnson, Holger Olin
Johnston, Leslie Alexander
Jones, Charles T.
Kapner, Harvey Herbert
Kauffman, James S.
Kennedy, Joseph Brady, Jr.
Kennedy, Luther E.
Keplinger, Charles Henry
Kezeler, James Linden
Kies, Myron C.
Kimbball, Kent K.
King, Charles C.
Kisling, James W., Jr.
Kittredge, Frank R.
Knappen, Russell S.
Koehn, Ralph A.
Kramer, William B.
Kravis, Raymond F.
Kridler, George M.
Kunsman, Howard Smith
Lamar, Lee C.
Lambert, Gerald S.
Lane, Charles W.
Larkin, Pierce
Latta, Albert Lloyd
Laves, U. R.
Leach, Thomas W.
Leavitt, William Bradbury
Leibrock, Robert M.
Leiser, J. B.
Lewis, Jerry Burton
Lilienborg, Burton Armand
Littlefield, Max S.
Longmire, William R.
Lukert, Louis H.
Lyons, Paul L.
Maher, John C.
Manhart, T. A.
Markham, Edmond O.

Markley, Elmer A.
Marmaduke, Richard Calvin
Marshall, Lester Ray
Matson, Thomas Edwards
Maverick, Phillip
Mayes, Tom D.
McAdams, Ronald Earl
McClure, Clair Edmond
McCrary, E. W.
McCready, Harry Joseph, Jr.
McGehee, J. Rex
McGill, James N.
McHugh, James W.
McIntyre, Paul J.
McMillen, Raymond F.
McMorris, William Albert, Jr.
Merritt, John W.
Mershon, Milton M.
Miller, Buford Maxwell
Miller, E. Floyd
Miller, Wendell Z.
Millikan, Charles Y.
Millison, Clark
Mohler, Charles Edwin
Monahan, Foster Murray
Moore, Homer Clarence
Moore, Horatio L.
Morero, Joseph E.
Morley, Harold T.
Mosburg, Lewis G.
Moses, Harold F.
Mossman, Reuel Wallace
Mumford, Clarence Scott
Murphy, James K.
Murray, Albert N.
Muselman, George Abraham
Nafziger, Luther Orlando
Neal, Eugene Preston
Nelmark, John H.
Neumann, L. Murray
Newman, Thomas F.
Northrip, Gerald Albert
Nufer, D. C.
Oliphant, A. G.
Oliphant, Charles W.
Page, Charles Newton
Pakiser, Louis Charles, Jr.
Palmerston, Stewart Colin
Patton, Roger R.
Peabody, Harlan W.
Pelps, Frederick G.
Pilkinton, Edgar Merrill
Porterfield, Robert R.
Price, Sylvan S.
Raborn, Smiley, Jr.
Rae, Colin C.
Reed, George Wylie
Rees, Forest Bovaird
Reeves, James E.
Reid, Kenneth James
Reisher, Paul H.
Renfro, Harold Bell
Reno, Duane H.
Reynolds, Karl W.
Richards, Raymond
Richardson, Carl B.
Riggs, Robert J.
Roark, Edward L.
Roark, Louis
Roark, Ralph B.
Roberts, Francis Archibald
Roberts, M. C.
Roberts, Price E.
Roemer, Cletus Daniel
Rogers, Andrew J.
Ross, Charles M.
Ross, Ralph B.
Rutledge, Richard B.
Rupnik, John J.
Ryniker, Charles
Schaeffer, Hugh C.
Scott, H. M.
Scott, Vernon C.
Seaman, L. O.
Sharpe, Joseph Audley

Shea, Edward F.
Sherry, William J.
Shutt, Roscoe E.
Sidwell, Carroll Vincent
Silverman, Daniel
Simpson, Richard Walker, Jr.
Sinclair, William B.
Siverson, Garfield C.
Smith, Gerald N.
Smith, Riley Seymour
Snow, Dale R.
Snow, Robert Dale
Soliday, Albert LaFayette
Spangler, Grant W.
Stevens, Freeland Howard, Jr.
Stirtz, W. Melvin
Stoner, O. E.
Strachan, Clyde G.
Sype, William Russell
Tappolet, W. A.
Tarr, Russell S.
Taylor, Garvin L.
Teis, Maurice R.
Templeton, James B.
Thompson, James William
Tillotson, Allen W.
Toomey, Charles Calvin
Travis, Richard Sandow
Truxer, Arthur F.
Tucker, Reese Herrick
Tuttle, Richard Carol
Upp, Jerry E.
Vernon, Jess
Waering, Erik Norman
Wagner, Carl D.
Wagner, Clyde L.
Wagner, Oscar Emil, Jr.
Wails, Elmer Dennis
Walker, Lucian H.
Walters, Robert F.
Wanemacher, Joseph M.
Ward, Dwight Edward
Watson, Allan Payve
Watson, Joseph D.
Weatherby, Benjamin B.
Weimer, Frank G.
Weingartner, R. A.
Welch, Virgil H.
Wells, Samuel W.
Wesley, George Rutherford
Westby, Gerald H.
White, Kirk Schroder
Widess, Moses B.
Willis, S. Morse
Wilson, James Neff
Wilson, Walter B.
Wines, Donald Bradford
Wing, Robert Busch
Wood, Robert H.
Wood, Virgil O.
Woodruff, Elmer Grant
Woods, Sam H.
Wyman, Everett A.
Younkman, Harry D.
Yust, Morton Ripley
Zoller, Lawrence J.

VELMA—Finning, Robert Louis
WADE—Goodman, P. W.
WATONGA
Martz, Walter Scott, Jr.
WEWOKA—Stoker, Carl E.

OREGON

AURORA—Lester, O. C., Jr.
EUGENE
Baldwin, Ewart Merlin
PORTLAND—Hodge, Edwin T.
McCosh, Bonnie Eneud
Stewart, R. E.

PENNSYLVANIA

BRADFORD—Eckert, Frank E.
Fralich, Charles Eugene
Harding, Richard Walter
Heck, Edward T.

Hughes, Richard V.
Shoemaker, William Morris
Simmons, Arthur Carlisle
Stephens, Maynard Moody
BAYN MAWE—Dryden, Lincoln
COUTERSPORT
Cole, Adna Malone
DELMONT—Zimmerman, James Z.
HARRISBURG
Cathcart, Stanley Holman
Stephenson, Robert Charles
LANGHORNE—Olsson, Axel A.

MT. CARMEL
Rothrock, Howard E.
Wagner, Holly Clyde
OIL CITY—Secor, Donald T.
Seifert, Wilbur H.

PHILADELPHIA
Harris, Richard C.
Helis, James
Jensen, Homer
Kammerer, John Craig
Latimer, Fred Hubert
Mason, John Frederick
Miller, Lloyd Eugene
Monk, John Calhoun
Richards, Horace Gardiner
Weeks, Albert W.
Weeks, Herbert J.

PITTSBURGH
Allen, Frank Tilbury
Allon, Meyer Michael
Aszklar, Stanley J.
Backman, John Edward
Bassett, Charles F.
Baxter, John C.
Bayles, Robert Ellery
Brankstone, Hugh R.
Brockway, LeValley Irving
Cox, Benjamin Burton
Eckhardt, E. A.
Feldmiller, Charles Henry
Fetke, Charles R.
Finn, Fenton Harrison
Foster, Alden W.
Galey, John Taylor
Galpin, Sidney Stewart
Gardner, Louis W.
Gealy, Wendell B.
Goodman, John Vollmer
Grow, George Copernicus, Jr.
Gulley, M. Gordon
Hammer, Sigmund Immanuel
Hanson, William E.
Hastings, Wynne K.
Heald, K. C.
Huntley, Louis Grow
Huntley, Louis Guy
Ingham, Albert Irwin
Jones, Robert William
Kerbow, Russell B.
Lang, Ralph H.
Lilligren, Jonathan Martin
McConnell, Duncan
McGrew, Harry Johnson
Melchior, Louis Francis
Meszaros, William Andrew
Newlon, John Hawker
Patnode, Homer Whitman
Prouty, Chilton Eaton
Rand, Wendell P.
Rhoades, Ralph O.
Robinson, W. Bernard
Sherrill, Richard E.
Somers, Ransom E.
Swain, James Fulton
Vance, Warner R.
Watson, George R.
Webb, Edwin James
Wendenburg, Otto
Wylie, James R., Jr.

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Gaddess, Jack
STATE COLLEGE
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Pirson, Sylvain J.
Rosenfeld, Melvin Arthur
Swineford, Ada

SOUTH CAROLINA

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COLUMBIA
Buie, Bennett Frank

SOUTH DAKOTA

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Tullis, Edward Langden
VERMILION
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Moneymaker, Berlen C.
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TEXAS

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 Gaby, Edwin D.
 Garrett, Melvin M.
 Germany, Eugene Ben
 Germond, Kenneth Work
 Gile, Richard E.
 Gillin, John A.
 Gilmore, Kathleen K.
 Gilmore, Robert Beattie
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Walton, Oscar Edward
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North, Lloyd
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ENCINO
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FALFURRIAS

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Hord, John Alan
Hudson, William A.
Humzicker, Ashley Andrew
Hyde, Clarence E.
Imbt, Robert F.
Itten, Howard Edward
Johnson, James F.
Kendall, John M.
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La Neve, R. O.
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Leeds, David Jacob
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Prokesch, Hugh E.
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Raish, Henry Gustav
Renaud, Charles L.
Renfro, Millicent Aloyse
Ricks, Francis Maurice
Romine, Thomas B.

Rowser, Edwin M.
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Schweers, Richard Henry
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Thompson, R. R.
Thomsen, Erik
Trenchard, John
Upson, M. E.
Vanderpool, Harold C.
Van Steenberg, Samuel Kermit
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White, Luther H.
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Burton, George E.
Lynn, Robert H.
Swick, Leo E., Jr.
Thomas, William T.
GALVESTON—Ellisor, Alva C.
Hull, Arthur M.
GENOA—Fool, Frank Morrow
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Blank, Horace Richard
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GONZALES
Bybee, Robert William
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Russell, Hewlett A.
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HAMILTON—Stiles, Elisabeth
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Goodin, George Lewis
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Aderman, Charles Vidor
Adkins, W. S.
Adler, Joseph L.
Akkerman, Richard Pete
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Allen, Charles Maurice
Allen, Harris Hayes
Allen, Stanley R.
Anderson, John G., Jr.
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Andrews, Wilton W.
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Baird, John Malcolm
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McCarty, Dana Gerald
McDonnell, Haydon W.
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McGowan, F. H.
McGuirt, James H.
McLellan, Hiram J.
McReynolds, Gregg F.
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Meyers, Percy A.
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Miller, John C.
Miller, Robert DuWayne
Ming, Raymond E.
Minor, H. E.
Mitchell, George Dampier, Jr.
Mitchell, Robert B.
Montgomery, James Campbell
Morgan, George Oliver
Morgan, John Man
Morris, A. Ferd
Morris, Louis Henry
Morris, Michael Boris
Morrison, T. E.
Morse, Roy R.
Mosson, Stuart
Mower, Lowell K.
Mueller, Frederick Walter
Myers, John C.
Nance, Albert G.
Neal, Richard Freeman
Nelson, Floyd A.
Nelson, Fred M.
Nettelton, L. L.
Neuman, Leonard J.
Newfarmer, Leo Ray
Nichols, Ivan K.
Nichols, Ralph Gregory
Nicol, David
Noble, Homer A.
Noland, Orval W.
Nugent, Laurence Earl, Jr.
Nye, George Layne
O'Brien, Decatur
O'Donnell, Lawrence
Oggs, Thomas A.
Olcott, David Perry
Orynski, Leonard W.
Osterhout, Walter J.
Oualline, Judd Hamner
Owen, Kenneth Dale
Parent, Frank Watson
Park, Noel Robertson
Parker, William Gilmore
Parker, William Henry, Jr.
Parsons, Claude P.
Patrick, Walden W.
Pawley, Julian Kingsbury
Paxson, Roland B.
Payne, Roy A.
Peacock, Henry Bates
Pena, Sam M.
Petrusek, Benjamin J.
Phillips, Henry H.
Pollard, Jack C.
Pressler, Claude Daniel
Pressler, Edward D.
Pyeatt, Lloyd M.
Quigley, Claude Merle, Jr.
Rabensburg, Aubrey Henry
Randolph, James Richardson
Rassinier, Edgar A.
Ray, Robert Hillyer
Reasoner, Melton A.
Reed, Charles Merton
Reed, Edwin M.
Reed, Paul Carly
Reedy, Milton Frank, Jr.
Reiter, Wilhelm A.
Remick, David B.
Reynolds, Frank Fisher
Riddle, James Irvin, Jr.
Robertson, Parker A.
Rolshausen, F. W.
Roos, Lewis Van Skite
Roper, Frank C.
Rosaire, E. E.
Rose, Nicholas Anthony
Rowland, Richards Atwell
Runion, Felix Anthony
Russell, C. A.
Rust, William Monroe, Jr.
Sample, Charles Hurst
Sappington, Chester
Sasse, Jerome B.
Sauls, James LeRoy, Jr.
Saville, Wilson Gordon
Sawtelle, George
Schaffer, Sidney
Scholl, Louis A., Jr.
Schumacher, Jan P.
Selig, A. L.
Seren, Gordon Wilbur
Sheets, Martin Meredith
Sherar, Edgar Smith
Sherar, Stuart
Shimek, E. Joe
Simmons, Benjamin T.
Sims, Samuel Eberle
Smiser, Jerome S.
Smith, Arthur E.
Smith, Aylwin Lorenzo
Smith, Edward James, Jr.
Smith, Erwin W.
Smith, Fred Lewis, Jr.
Smith, Gerald J.
Sollars, Perry Fredrick
Somers, George Brooks
Sorenson, Ira LeRoy
Spahr, Marshall Richard
Sparenberg, G. Russell
Speed, Carleton D., Jr.
Spoor, Harry C., Jr.
St. Germain, R. J.
Stangel, Frank J.
Stark, Betty Jean
Stephenson, Elizabeth Ear

- Stephenson, Morton B.
Stevens, George D.
Stewart, Charles H.
Stoddard, Gail Hyatt
Stone, George Bailey
Stoneham, Sebron Lloyd
Stratton, Everett Franklin
Stubbs, Sidney Alton
Stuckey, Charles W., Jr.
Swigart, T. E.
Symonds, Henry Gardiner
Tamborello, Anthony Joseph
Tatum, Emmett F., Jr.
Taylor, Josiah
Taylor, Thomas Francis
Taylor, W. Harlan
Teague, James Udell
Teas, L. P.
Teten, Robert Paul
Thomas, William A.
Thompson, Evan G.
Thompson, Raymond James
Thompson, Wallace C.
Todd, John David
Torrey, Paul D.
Travis, Maury Marion
Troxell, John N.
Tucker, Robert Louis
Turner, George Raymond
Tyson, Alfred K.
Van Burgh, Lisle R.
Van Eaton, Raymond Andrew
Van Melle, Francois Anthonie
Vaudoit, Paul L.
Vetter, John M.
Vittrup, Lawrence J.
Vogel, Felix A., Jr.
Vogler, Edward Allen
Voigt, Harold E.
Von Eiff, Herbert Craft
Whittington
Wallace, Davis M.
Wallis, Frederick Bradley
Ward, Roderick G.
Warner, Charles A.
Warren, Howard C.
Weaver, Paul
Welsh, LeRoy G.
Wendler, Arno Paul
West, Norman Neal
Westmoreland, Frank Smith
Weymouth, A. Allen
Wheeler, James Albert
White, Daniel Jefferson, Jr.
Whitsitt, Charles Dalton
Wiley, Richard Allen
Wilhelm, Oscar
Williams, Charles Hiram
Williams, Herbert E.
Williams, Milton
Wilson, Arthur Noble
Wilson, Ernest Bradley
Wilson, Forest Wayne
Wilson, Ralph Woodrow
Wolf, John Schiller
Wolf, Albert G.
Wolf, George H.
Wolfram, Bertram, Jr.
Wood, Mary C.
Wood, Owen Bishop
Woods, Raymond Douglas
Yarborough, Hunter, Jr.
Zaba, Joseph
Zeithaus, Roy Calvert
Zimmerman, Charles C.
Zirbel, Nicholas Newton
- JEFFERSON**—Flesh, David James
KENDRY—Ramsay, James Edwin
KERMIT
Baker, Sidney McClellan
Spencer, Samuel Aaron
KILGORE
Caver, William Frank
Des Jardins, Peter Edward
- Fouts, John M., Jr.
KINGSVILLE
Dismukes, James Samuel
Livingston, Noyes B.
Miller, William Rinehart
Mull, Charles William
Porter, Hugh, Jr.
LAMFSA
Giles, Howard Windfield
LAREDO—Calohan, William F.
Campbell, John M.
LOCKHART—Brown, Ira Otho
Nodley, William E.
LONGVIEW—Bush, Robert Ewell
LUBBOCK
Daly, John Warlaumont
DeWoody, Ralph Cool
Elkins, Campbell Hill
Feather, Virgil G.
Johnson, Lester Hayden
Klaus, Hellmut
Langston, Wann, Jr.
Latch, Leonard
McAdams, James Lusk
McCoy, James Roy
Patton, Leroy T.
Robinson, Wilbur Irving
Sidwell, Raymond
LULING—Woolsey, E. V.
MARATHON
Maxwell, Ross Allen
MARFA
Rogers, Carl Pembroke, Jr.
MATAGORDA
Kits, Clifford Harold
MCAILEN
Blackwell, William George
Nichols, C. R.
Oliver, Richard R.
Robinson, Cecil D.
Russo, Martin
Smith, Lee Cherry
Warner, J. Laird
Young, John A., Jr.
MCCAMEY
Johnson, Rogers William
Russell, Randall Wayne
MEXIA—Liddle, Ralph A.
MIDLAND—Abell, George T.
Allen, William Hammond
Anderson, Kenneth Clyde
Anderson, Richard S.
Anderson, Warren D.
Arick, Millard B.
Armstrong, J. M.
Ashmore, Leland Wayne
Bailey, John James
Barnhart, Carl F.
Bartley, Jerald Howard
Beckmann, Harry LeRoy
Bell, Donald
Berg, Ernest L.
Bradford, Charles Edward
Bradley, Henry Waring
Brabaney, Frank T., Jr.
Branson, Carl Colton
Brown, Leslie Thomas
Brown, Prentice F.
Bucher, John Eric
Butcher, Cary P.
Canon, Joe
Cantrell, Cyrus Duncan, Jr.
Carter, George R.
Chambers, Ralph David
Chase, Carlos Louis
Clarke, Robert L.
Clarison, William George, Jr.
Coil, Fay
Cole, Charles Taylor
Conkling, Russell C.
Cubling, William Henry
Corey, George Simpson
Cottingham, Virgil E.
Cotton, James Russell
- Covington, Jerry
Cox, Robert T.
Cox, Thomas S.
Cox, William Edgerton
Crawford, Gayle F.
Crotty, Burns McCashin
Dale, Dare Daniel
David, Max
Davis, Howard Eugene, Jr.
DeFord, John Hill
DeFord, Ronald K.
Dickey, Robert I.
Diemer, Raymond Adams
Donnelly, Aiden Stuart
Dougherty, William Edgeworth
Douglass, Francis A., Jr.
Doyle, Robert
Dressel, Waldemar M.
Dunn, David Arthur
Durham, Charles Albert
Dykstra, Bouwe
Ehlers, Allen
Ferrell, Jane
Fillman, Louise
Firstenberger, John Graeme
Fitting, Ralph U., Jr.
FitzGerald, James, Jr.
Floyd-Jones, Jane
Forgeron, Harold S.
Forward, Frederick William
Fritz, William Clayton
Gibson, George Randall
Giesey, S. C.
Goodwin, Reo Eldon
Green, Charles Campbell, Jr.
Grice, Charles Richmond
Grissold, Edward Harvey
Haase, Fred M.
Haigh, Berte R.
Harbison, Robert Ranney
Hardison, Harvey
Hardwick, James Vincent
Hargraves, Rolla Eugene
Harper, Oliver C.
Harter, Clyde C., Jr.
Hartwell, Moreland T.
Hatch, Jesse Duff, Jr.
Hedrick, O. F.
Heid, Gordon Witherspoon
Hemphill, Herbert A.
Henderson, Charles Frederick
Henderson, William David
Hennen, Ray V.
Hilburn, Sam E.
Hill, Ewing Robinson
Hills, John Moore
Hirsch, Nolan
Hitchcock, Edmund Stewart
Holland, Dorothy Siney
Hollingsworth, Richard Vincen
House, Robert Arling
Huffman, Harold LaVergn
Hyde, Ben Cooper
Ireland, Hubert Andrew
Irwin, Wallace W.
Johnson, Jane Marie
Jones, Crandall Davis
Jones, J. Robert
Jones, Theodore S.
Jordan, J. B.
Jorgensen, Jay A.
Kellett, Louis B.
Kerr, Edwin F., Jr.
Kinsardin, John
Koernig, Joseph Baldwin
Kolm, Paul H.
Kotzya, Fred Frank
Kribbs, George R.
Larsh, Napoleon Bonaparte
LeBlond, Robert Edmond
Leeper, Ann Bertrand
Lindeblad, E. E.
Lindeblad, Ludvig C.
Linehan, Charles M.
- Lloyd, E. Russell
Loskamp, Alvin P.
Lyle, William Eugene, Jr.
Maley, Vaughn C.
Mauck, Melvin Dwight
McClure, Harold Yokum
McClure, Joseph Hugh
McCullough, Edward Allen
McEachin, Wright Daniel
McGuigan, Francis Henry
McKinsey, Mark Howard
McLennan, Lamar, Jr.
McRae, Walter Thomas, Jr.
Menish, Jack Angus
Metz, Milam Sutton
Meyer, John Carl, Jr.
Meyer, Robert Frederick
Michaelson, Louis Henry
Miller, Harry August, Jr.
Miller, Milward
Mills, Coe S.
Mills, Lloyd Clarence
Moore, Joe Laurence
Moore, John I.
Moore, Lee Wayne
Moore, Prentiss D.
Morgan, Robert Edward
Morningstar, Clyde Franklin
Nelson, Paul Hugh
Newton, Kenneth
Oliver, Donald McCreery
Osborn, William Macklin
Osborne, W. C.
Park, Lee Brown
Parker, Thomas Reilly
Parsons, Kenneth Robert
Patterson, Luther Edwin, Jr.
Pearson, Carol
Pederson, Clyde Marion
Penn, William Y.
Pennel, Harry David
Perusek, Cyril Joseph
Peters, Layton Marie
Pettit, Albert Edwin
Powers, Elliott H.
Price, James A.
Putnam, George D.
Rankin, Horace Ellis
Rankin, Robert Estes
Ray, Bernard Arthur
Reed, Edward Looman, Jr.
Reeves, Frank W.
Repecka, Albert Lee
Rhodes, Mary Louise
Roark, Robert Emmett
Rodgers, Jack Pinknea
Rogers, Jesse Armstead
Rogers, Victor William
Russell, Harry Jones, Jr.
Ruwwie, John W.
Schneider, William Thomas
Scholl, Milton Richard, Jr.
Scobey, Ellis Hurlbut
Scobey, Warren Barrett
Scrogin, John Mills
Secor, Dana M.
Sellen, C. Wayne
Senning, Robert Conrad
Shaeffer, Stanley Beaubien
Shakely, Ed.
Shaw, Charles Anderson
Shock, Lorenz Ira
Skinner, John Wesley
Skraberger, John Warren
Sleepers, James Lockert, Jr.
Smith, Holly E.
Snyder, Raymond W.
Spivey, Robert Charles
St. Clair, Donald W.
Stall, Trovall Lafayette
Steig, Maynard H.
Steinberger, Clair R.
Stoltenberg, Harold Waite
Swanson, Raymond H.

Swords, Henry Leonard
 Symes, Clarence, Jr.
 Tanner, Hugh A.
 Terrill, John Vincent
 Tharp, Raymond Lee
 Thawley, Leonard Herman
 Thomas, Leonard C.
 Thomason, Ben R., Jr.
 Turner, Clyde Weldon
 Uhrig, Leonard F.
 Vanderpool, Eugene Ward
 Veeder, John A.
 Vertres, Charles D.
 Von Osinski, William P. C.
 Waldschmidt, W. A.
 Walne, Walter Hillman, Jr.
 Warren, John Edwin
 Warren, Walter Cyrus
 Watson, Robert N.
 Weaver, Oscar David, Jr.
 West, William Ward
 White, Gordon H.
 Wilkes, Betty Jeanne
 Williams, Harold L.
 Winkler, Hans
 Winter, Niles B.
 Woods, E. Hazen
 Woolley, William Leeman
 Wright, Fred S.
 Young, Addison
 Young, Claude T.
 NEWGULF—Judson, Wilbur
 NOCONA—Martin, P. M.
 NOME
 Pierce, Harold Frederick
 ODESSA
 Brouwer, Luitzen Egbertus Jan
 Dahl, Arnold C.
 Hamilton, Irving Boyd
 Story, James Richard
 OLNEY—Craig, William Henry
 Hayes, Retse L.
 Whitcomb, Bruce
 PALACIOS
 Sisson, Harry Hensel
 PALESTINE
 Holcomb, Frank Herman
 Williams, Richard
 PAMPA
 Anderson, Benjamin Louis
 Gallie, John Francis
 McConnell, William Hall
 Sanford, Wendell Glenn
 Schwartz, Harold Edward
 PERRYTON—Bell, Clifton L.
 PLEASANTON
 Williams, Carroll L.
 QUTMAN
 Eckart, Robert R., Jr.
 RIVERSIDE
 Weinzierl, John F.
 ROBSTOWN—Bryan, B. F.
 ROSENBERG
 Ustynik, Edwin Frank
 SAN ANGELO
 Bivens, Wilmer Edward, Jr.
 Cannon, Joe
 Cannon, R. L.
 Cardwell, D. Harold
 Dodson, Floyd C.
 Emch, John W.
 Giles, John M.
 Gregory, Joseph Nalle
 Hagan, Arthur M.
 Keller, Ray F.
 McCammon, John Henry, Jr.
 Morgan, George D.
 Ott, Emil
 Ray, Wilbur Clyde
 Simpson, Roscoe M.
 Walker, William Neill
 SAN ANTONIO
 Absher, Kenneth B.
 Achning, Walter J.

Alcorn, Avary Hunt
 Ames, Edward W.
 Bakke, W. E.
 Banks, Thomas R.
 Barbisich, Joseph William
 Bazshaw, Willis Oliver
 Becwar, Harold David
 Begeman, Robert Louis
 Benedum, Darwin
 Best, J. Boyd
 Blanchard, Stanley W.
 Bonar, Robert Emerson
 Boyer, Will W.
 Boyle, Walter J.
 Brown, Gilbert LeRoy
 Buskirk, Gordon Towers
 Camp, John F., Jr.
 Candelas, Alvin
 Cannan, Morris
 Chapel, Donald Owen
 Closuit, Ernest M.
 Coates, George H.
 Colton, Howard Franklin
 Cooper, Herschel H.
 Cormann, Hyman
 Corning, Leavitt, Jr.
 Crawford, Weldon L.
 Davidson, John Perryman
 Davis, Field M.
 Davis, Thornton
 Dawson, Herbert Marion
 Dickinson, Clyde Grant
 Douglas, L. A.
 Dove, Adolph
 Doyle, John Finley, Jr.
 Durward, Robert Harland
 Elms, Morris Allen
 Eysnell, Alfred Raah
 Fabre, Gilbert
 Ferguson, Marion Lee
 Ferrando, Aldo
 Fish, Leroy
 Forney, Maurice Edgar
 Freeman, James Clifford
 Gandy, Thomas Stephens
 Green, Guy E.
 Gross, Arthur B.
 Gruener, Thayer Meredith
 Gutke, Ralph Lewis
 Hammond, Weldon W.
 Hans, Edward Walter
 Haring, Louis Howard, Jr.
 Harrell, Marshall A.
 Harrison, John W.
 Helland, James Hans
 Hemmi, Carl Wilburn
 Henderson, H. H.
 Hensch, Carl Russell
 Herndon, Harold D.
 Hinyard, Paul Brown
 Holbrook, Finley W.
 Hopf, Robert William
 Howeth, Irving K.
 Hunter, Paul B.
 Hunzicker, Vernon Jacob
 Johnson, John Arthur
 Johnson, Edward Lee
 Kearny, Clinton Charles
 Kelley, Ward W.
 Kelly, John Schlagle
 Keppler, Leo G.
 Kline, Robert Walter
 Kohn, Robert N.
 Kurta, Robert G.
 Lawton, Joe
 Liddell, Jessie Kelsey
 Madden, Lloyd Willis
 Mann, Robert Scott
 Manthos, Atlee G.
 Masterson, Reba B.
 Matson, Martin
 McCann, Joyce Irene Waters
 McCluer, R. D.
 McDonald, Worth W.

Mebane, Robert Duff
 Melsheimer, Albert Harry
 Menger, Hubert Emil
 Minton, Morris Creswell
 Monsone, Emil
 Moore, Marion Jefferson
 Morey, Philip Stockton
 Myers, Julian Q.
 Narvarte, Peter Eugene
 Nelson, James C.
 Nelson, Jean O.
 Nicholls, William Marvin
 Nowotny, Wilbur A.
 O'Brien, Jerome Joseph
 O'Brien, Joseph Alfred
 Owen, Edgar Wesley
 Palmer, Leland L.
 Percy, Charles Stuart
 Petrick, Glen
 Petty, Dabney E.
 Petty, Olive Scott
 Petty, Van A., Jr.
 Picklesimer, Harold G.
 Porch, Edwin L., Jr.
 Potter, Grover C.
 Rabel, Hylda Merle
 Rathbun, Keith L.
 Ratliff, Guy Marvin
 Renick, B. Coleman
 Rife, Byron
 Roberts, Gerald C.
 Rogers, James K.
 Rois, Chester A., Jr.
 Ross, John C.
 Roy, Charles H.
 Rowden, Dale Henry
 Rudolph, Paul Jackson
 Sandidge, John R.
 Sandifer, Donald Ford
 Schmidt, Karl Henry
 Schoolfield, R. F.
 Scott, Arvin Forrest
 Scrafford, John Bruce
 Sebring, Louie, Jr.
 Seeligson, Arthur A., Jr.
 Semmes, Douglas R.
 Shaw, Silas Frederick
 Sheldon, Mary Elizabeth
 Shelton, George H.
 Sloss, James Parker
 Smith, George Wendell
 Snow, Arthur Leland
 Souther, John B.
 Spice, William H., Jr.
 Stapp, Wilford Lee
 Stewart, Charles A.
 Still, John T.
 Storm, Willis
 Swiger, Rual B.
 Teagle, John
 Tobin, Don Freeman
 Tucker, Bill Curtis
 Tucker, Reagan
 Underwood, George Woods
 Vesely, Leon Robert
 Wagener, Charles H.
 Warner, Ralph E.
 Weatherston, Douglas
 Webb, Sam Nail
 West, Lloyd G.
 West, Thomas Scott
 Whitaker, Harvey
 Wiegand, Frederick William
 Wieringa, Leon Otis
 Woollett, LeRoy Andrew, Jr.
 SAN BENITO—Parker, Lloyd S.
 SEGUIN
 Leonard, Clarence Ziegler
 SEYMOUR
 Kemp, Augusta Hasslock
 SHERMAN
 Bowen, Gilbert Todd
 Schilleff, Hubert Lee
 SINTON—Fipps, E. L.

Jennings, Charles I.
 LaRue, Wilton W.
 Thomas, Joseph Wayne
 Yokam, Harlan Hunter
 STAMFORD
 Hakes, Willard Renick
 SUDAN—Perrin, Francis Ward
 SWEETWATER
 Alderman, Willis Howard
 Johnson, Elton DeLoss
 Montgomery, Porter A., Jr.
 TAYLOR—Grimes, Russell W.
 THREE RIVERS
 Dexter, Laurence N.
 TYLER—Adams, Frank C.
 Alexander, C. I.
 Barling, Robert
 Bell, John Smith
 Bierman, Alfred C.
 Branson, Delmar O.
 Brocato, Charles P.
 Brock, Stephen W., Jr.
 Brooks, Olin D.
 Bunch, Rosella Leota
 Bunn, John K.
 Burford, Selwyn O.
 Burnett, T. J.
 Campbell, Thomas Brown
 Cash, Thornton C.
 Clark, G. Conrad
 Dante, John Henry
 DeLong, Jack Myler
 Eaton, Robert Wesley
 Ely, George Norman
 Fox, Hamlin Garland
 Gibson, Donald Thomas
 Gilles, Lawrence A.
 Hays, Mack Lawrence
 Hood, Forrest W.
 Howard, Edward Lain
 Hudnall, James S.
 Johnson, Thomas Jesse
 Lees, Laurence F.
 Lester, Howard H.
 Loetterle, Gerald John
 Long, Walter Edwards
 Lozo, Francis Edgar, Jr.
 Matheny, H. Claire
 Melzer, Laurence S.
 Mix, Charles A.
 Moore, Barton Walker
 Pirtle, George W.
 Potter, Harold Eugene
 Price, John C.
 Richardson, William Eastburn
 Schoeneck, Philip S.
 Shelby, Thomas H., Jr.
 Teft, Gerald Homer
 Trowbridge, Raymond M.
 Wendlandt, Edward A.
 Wilson, Edward B.
 Wright, Andrew Clemmons
 Youngmeyer, Ray
 VICTORIA—Fly, Paul J.
 WACO—Gill, J. Willard
 WATER VALLEY—Kinkel, W. C.
 WEATHERFORD
 Smith, John Peter
 WESLACO
 Christner, Harold Reed
 WICHITA FALLS
 Adams, Robert James
 Ammon, Walter Lamm
 Amyx, James William
 Birk, Ralph Adolphus
 Bitgood, Ellen Posey
 Bowen, James P.
 Cole, Mary Jane
 Crider, Lewis Cain
 Cunningham, Carleton J.
 Curd, Robert Carlton
 Daniel, Orion A.
 Davis, Lon, Jr.
 Dennis, Lyman Clark

Dimock, George Wagner
 Drake, Robert Tucker
 Edwards, Acus Rex
 Ellison, Samuel P., Jr.
 Foodick, Arthur R.
 Foster, Fred K.
 Fowler, William James
 Franklin, Donald Wilbert
 Gibbs, James F.
 Giddings, Harvard
 Gisburne, John Robert
 Gram, Oscar Ehsen
 Gray, Donald Arthur
 Harden, Lynn L.
 Hardison, George Porter
 Haseltine, William Lloyd
 Hauptman, Herman Ray, Jr.
 Heath, Parrish Richard
 Heninger, Dan D.
 Ise, Charles Henry
 Kay, John A.
 Kelly, Donald
 Lane, William J.
 Langford, David Kemp
 Larson, Philip D.
 Lucke, Lester A.
 Mankin, Warren Ward
 Martin, Robert Henry
 Maucini, Joseph J.
 Mayfield, William Isaac
 McBroom, William Ernest
 McCollum, Aubrey Britton
 McDonald, Joseph Wilson
 McGaha, Charles P.
 McKinlay, Ralph Harold
 McLaren, Robert L.
 McMahon, Beverly Edith
 Mohler, Donald Phillips
 Moorhead, Johnny Bob
 Mort, Frank Paulsen
 Mowrer, Loren E.
 Noon, Theodore Woods, Jr.
 Pettigrew, Virgil
 Petty, T. F.
 Phillips, Richard Beach
 Purcell, Paul E. M.
 Richards, David Taylor
 Rickard, Hilton Lloyd
 Roth, Robert
 Russell, J. J., Jr.
 Ryan, Jack Burnside
 Sanford, Finis Mack
 Scholl, Guy J.
 Seitz, J. R.
 Shirk, Wilmer Ray
 Simic, Dolphe E.
 Smiley, H. F.
 Sneed, William F.
 Stille, Earl M.
 Teel, Dick
 Wadsack, George E., Jr.
 Waggoner, Stephen Gose
 White, Albert William
 Wilson, James Ernest, Jr.
 Wood, Clint B.
 YOAKUM—Hoyt, William V.

UTAH

LOGAN—Williams, J. Stewart
 OGDEN—Adair, J. Smith
 PROVO—Hansen, George Henry
 ROOSEVELT—Toland, David R.

SALT LAKE CITY
 Bowen, Charles F.
 Donohoo, Horrie Van Waldo, Jr.
 Gaul, George Howard
 Hauptman, Charles A.
 Hunt, Charles B.
 Minton, Robert Joseph
 Morgan, Frank Albert, Jr.
 Needham, Claude E.
 Whittier, William H.
 VERNAL—Beer, George William
 FAIRBANKS—Verne Eugene, Jr.
 Fields, Harry B.
 Williams, Philip Anthony

VIRGINIA

ALEXANDRIA
 McLean, James Douglas, Jr.
 Nye, S. Spencer
 CHARLOTTESVILLE
 Cederstrom, Dagfin John
 McGill, William M.
 Sinnett, Allen
 FALLS CHURCH—Lindsay, Ben E.
 LEXINGTON
 Stow, Marcellus Henry

WASHINGTON

COULLEE DAM
 Goldsmith, Leo Jean
 ELMA—Lupher, R. L.
 OLYMPIA
 Billman, Harold G.
 Chawner, William Donald
 Glover, Sheldon L.
 Hanson, Hal Craig
 Heathman, Walter W.
 Holcomb, Leroy Delville
 Kirschner, Charles E.
 Stanton, W. Layton, Jr.
 PULLMAN—Culver, Harold E.
 McLaughlin, Kenneth Phelps
 SEATTLE—Barksdale, Julian D.
 Cochrane, Wallace Harlan
 Hunt, Leo Frank
 Mitchell, Harold DeLong
 Monahan, Charles Joseph
 Weaver, Charles E.
 Willis, Clifford L.
 SPOKANE
 Kirkham, Virgil R. D.

WEST VIRGINIA

CHARLESTON
 Barney, Arthur Y.
 Billingsley, J. E.
 Crouse, George T.
 Lafferty, Robert C., Jr.
 Maxwell, William Byron
 McClain, Alan H.
 Simmons, Harvey Jefferson, Jr.
 Stanton, Edward Cramon, Jr.
 Ziebold, William O.
 CLARKSBURG
 Mayfield, William W.
 Tollefson, Everett Harold
 HUNTINGTON
 Miller, William Clubine
 LEWISBURG
 Argabrite, William Graeme
 MONTGOMERY
 Morgan, Ray Earland

MORGANTOWN...
 Alkire, Robert Leo
 Galpin, Sidney L.
 Price, Paul Holland
 Reiser, David B.
 Tucker, Rieta Courtney
 PARKERSBURG
 Rogers, Reginald Douglas, Jr.
 SPRING HILL—Hall, George H.

WISCONSIN

BELOIT—Cronis, Carey
 MADISON
 Thompson, Marcus Luther
 Twenhofel, W. H.
 Young, Keith P.
 MAYVILLE—Buchner, Carl F.
 MILWAUKEE
 Greacen, Katherine Fielding
 Robinson, Florence Marie
 MONROE
 Frautschy, Jeffery Dean
 WEST ALLIS
 Mestier, Arthur Joseph, Jr.

WYOMING

BASIN—Harris, Loy Everett
 CASPER—Ager, Charles Samuel
 Allardice, Robert Edward Lee, Jr.
 Barkell, Clifford Abbott
 Barrett, Albert F.
 Beitman, Raymond E.
 Berry, George Willard
 Boos, Edward J.
 Brinker, Willard Franklin
 Chorney, Raymond
 Clark, Alexander
 Coester, Brower Burroughs
 Crawford, James Gilmore
 Curry, H. Donald
 Curry, William H., Jr.
 Dady, William George
 Edstrom, Donald Edwin
 Fanshawe, John Richardson
 Farmer, Paul Herbert
 Fenwick, Willis Henry
 Ferguson, Robert Dewitt
 Gist, James T.
 Goering, Milford Wayne
 Gorton, Kenneth Arnold
 Hall, W. E.
 Hiestand, Thomas C.
 Hoenshell, David T.
 Horn, George H.
 Hubley, Myron D.
 Iglehart, Charles Fayette
 Junger, Arne
 Kelley, Frederic Richard
 King, Victor H.
 Kirby, Thomas L.
 Klett, Richard Charles
 Knouse, William Stanley
 Krampert, E. W.
 Larsen, Raymond M.
 Larson, Carl L., Jr.
 Larson, Wilbert Sanford, Jr.
 Lindsay, Robert English
 Macbius, Jed B.
 McCabe, William Stokes
 McCanne, Rolland W.
 McCoy, Joseph Hanford
 Mercer, Leonard Arthur

Miller, John Robson
 Netterstrom, Paul W.
 Olson, Waynard George
 O'Rourke, Simon Philip
 Parker, John Marchbank
 Partridge, John Frederick, Jr.
 Potter, Nelson B.
 Rea, Henry Carter
 Reinhart, Philip W.
 Roberts, Thomas N.
 Schieck, Emmett E.
 Schwabrow, John R.
 Sclaff, Robert L.
 Souder, Warren James
 Spalding, Robert W.
 Spencer, Jesse Emory
 Summerford, H. Edgar
 Surber, Nathan Courtney
 Tallant, Roy L.
 Thier, Maurice Pierre
 Van Gilder, H. R.
 Wallis, William Sherrill
 Walton, Paul Talmage
 Winfrey, Donald B.
 Woodbury, Homer Olwin
 CHEYENNE
 Williams, Charles C.

CODY
 Fusselman, Joseph Landrey
 Gilbert, James Cornelius
 House, Roy Eldon
 Johnson, Moses Melville
 DUBOIS—Rhoades, Roy S.
 EVANSTON
 Bradbury, Albert Edward
 Landon, Robert Emmanuel
 Vrang, Christian M.
 LANDER—Knox, Robert John
 McCulloch, James Cole
 Rogers, Wilbur Frank
 Sharkey, Henry Howe Robbins
 Soderberg, Carney Ray
 LARAMIE—Baptist, Oren Cecil
 Beckwith, Radcliffe Harold
 Blackstone, Donald LeRoy, Jr.
 Espach, Ralph Homeward
 Krueger, Max L.
 Love, John David
 Thomas, Horace D.
 Thompson, Raymond M.
 LOST CABIN
 Tourlet, Harry Allison
 LUSK—Stafford, Clare J.
 NEWCASTLE
 Martens, Willis Pershing
 RAWLINS
 Hart, Lawrence Theodore
 Kyle, Jerry Robert
 RIVERTON
 Matthews, Edwin Patterson
 ROCK SPRINGS
 Fidler, Marion Moore
 Gras, Victor Brooks
 Kivi, Wilho John
 Nightingale, W. T.
 Rankin, Charles H., Jr.
 Skeeters, Warten Ware
 Zimmerman, Richard Franklin
 TEN SLEEP
 Parks, Emerson M.
 THERMOPOLIS
 Henkes, William Conrad
 Milek, William Arthur

OUTSIDE THE UNITED STATES

ALASKA

FAIRBANKS
 Chapman, Robert Mills
 Folk, Stewart H.
 Legge, John Allan, Jr.

ALBERTA

CALGARY—Abbott, Earl O.

Armstrong, John A.
 Beach, Hugh Hamilton
 Bishop, Robert Alexander
 Chilton, James Ryder
 Clare, Frederick Bernard
 Clark, Leslie M.
 Cook, Ian MacLaren
 Coote, George Frederick

Corbett, Clifton S.
 Erdman, Oscar Alvin
 Falconer, Wilbert Lawrence
 Farmilo, Alfred William
 Galloway, John O.
 Gilbert, Edward Everett
 Gleddie, Joseph
 Gray, John Gardiner

Hage, Conrad O.
 Hamilton, Frederick Jamieson
 Hancock, Willis Pritchard
 Harding, Stanley R. L.
 Helmig, Phillips Dobbs, Jr.
 Hoover, Malvern Edward
 Howells, William Crompton
 Hunt, Edwin H.

Hunter, Harry M.
Irwin, J. S.
Jacobson, Alfred Thur
Johnson, Russell V.
Keevil, Alan Richard
Killer, Frederick Anderson
Killick, Gordon Henry
La Berge, A. Lionel
Laver, Douglas Bruce
Lines, Frederic G.
Lockwood, Robinson P.
Mackenzie, Andrew N.
McKeever, John Herbert, Jr.
McKinnon, Frederick Allan
Nichols, Norval W.
Osborne, Lee S.
Perry, Robert George
Reisford, Harry Kenneth
Sanderson, James O. G.
Shaw, Ernest William
Slipper, S. E.
Spratt, Joseph G.
Walters, Ray A.
Webb, John Benwell
Weir, James Donald
Wilson, John Norman
Worfor, John Stephen
Wright, Willis I.
EDMONTON—Allan, John Andrew
Beard, Gordon Currie
Crockford, Michael B. B.
Ivanhoe, Lytton
Rutherford, Ralph Leslie
Stoneman, Harold Wright
Warren, Percival Sidney
LEDUC—Kerr, Samuel Aubrey
PRINCESS
Fulmer, Edward Andrew M.
TURNER VALLEY—Gallup, W. B.

ALGERIA

ALGER—Beall, Robert
Greant, George Camille F.
RELIZANE—Ten Dam, Abraham
SAINT SAENS
Ortynski, Hilary Igor

ANGOLA

LUANDA—Roschen, Ernest C. H.

ARGENTINA

BUENOS AIRES
Braccacini, Osvaldo I.
Cook, Carroll E.
Martin, Rodolfo
Rozlosnik, Andres
Tarragona, Jose
Wofford, Henry Rollins, Jr.
Zunino, Juan Jose

LA PLATA

Fossa-Mancini, Enrico
Maunt, Enrique Tomas
Sueto, Tomas

MENDOZA—Feruglio, Egidio S.**SAN JUAN—Leidhold, Clemens****TARTAL**

Tortea, Aniceto Horacio

TEMPERLEY

Ducloux, Abel Herrero

AUSTRALIA

BRISBANE—Morgan, D. E.
Wade, Arthur
CANBERRA
Raggett, Harold George
GORDON
Woolnough, Walter George
MELBOURNE
Gray, Kenneth Washington
Greenham, Roy Leonard
Reeves, Frank
Rudd, Eric A.
Stanley, G. A. V.
SOUTH PERTH—Moss, Frank A.

AUSTRIA

LAANKIRCHEN—Burgl, Hans
LOBEN
Petrasccheck, Wilhelm

BAHAMAS

NASSAU—Heggblom, J. Conrad
Spencer, Maria

BARBADOS

BRIDGETOWN—Senn, Alfred

BORNEO

SERIA—Visser, Willem Anthony

BELGIUM

BRUSSELS
Lombard, Augustin E.

BELGIAN CONGO

COSTERMANSVILLE
Touwaide, Marcel E.

BOLIVIA

LA PAZ—Munoz-Reyes, Jorge

BRAZIL

BAHIA—Almeida, Luis Alves de
de Carvalho, Yvan B.
Keller, P. Hastings
Pack, Oran L.
Sollero, Camillo Soares
BELEM—Mann, Neil Warren
RIO DE JANEIRO
Abreu, Sylvio Froes
Garner, Aubrey H.
Sao Paulo—de Lima, Plinio

BRITISH COLUMBIA

FORT ST. JOHN—Knox, John K.

VANCOUVER

Back, Denys Howard
Williams, Edwin P.

VICTORIA

Newmarch, Charles Bell
Williams, Thomas B.

BRITISH GUIANA

GEORGETOWN
Guimond, Stanislas de Kostka

BURMA

CHAUUK—Baxter, George William
Tainsh, Harold Robert

CHILE

PUNTA ARENAS
Barwick, John S.
Grossing-Freudenburg, Ber-

nardo
Kniker, Hedwig T.
Mordojovich, Carlos
Simian-G., Eduardo

Thomas, Chester Reams
SANTIAGO
Marino-Proby, Mario Rafael

Wenzel, Osvaldo Grube

CHINA

NANKING—Fu, Ch'eng Yi
PEIPING—Juan, Vei Chow

COLOMBIA

BARRANCA BERMEJA
Denton, William Ernest

BARRANQUILLA
Elliott, Douglas Howard
Lee, Herbert V.

Marti, Ernest John
Rigg, Robert Mader
Sanderson, William Johnston

Bocota
Acosta-Sarmiento, Gonzalo
Aitken, William Ernest

Alvarado, Benjamin
Ayers, Floyd M.
Barrett, John Frederick
Becker, George Thomas
Beuck, William Frederick
Bower, John O.
Brineman, John H.
Browning, John Mackintosh
Caudi, Cornelius M. B.
Chappell, Walter M.
Colley, Bernard Belden
Dohm, Christian F.
Dresbach, C. H.
Escallon, Marion Roberta de
Fogarty, Charles Franklin
Fonville, Herman Albert
Graves, Allan Dexter
Guerrero, Albert Lobo
Haadstra, Ulco
Hatfield, Willis Charles
Hazen, George Herbert
Henker, Warren Max
Joy, Oliver T.
Lee, Clarence L.
Lloyd, Joel Joseph
Lytle, Harvey M.
Mazurczak, Ludwig
Merritt, Roy W.
Miley, Roy Allen
Morales, Luis German
Mulholland, Malcolm M.
Murchison, Roderick Goldston
Naus, Arthur William
Nelson, Donald Oliver
Newbill, Thomas J., Jr.
Nygren, Walter Eric
O'Gara, William Thomas
Oppenheim, Victor E.
Ospina-Racines, Eduardo
Perko, Albert Richard
Petters, Viktor
Pierce, Guy Russell
Redmond, Charles David
Roach, Cyril Bloomfield
Robbins, Harold Weston
Sarmiento-Soto, Roberto
Saville, Charles William
Schoonover, Jack Gardner
Schroeder, Jean William
Sheldon, Robert Arnold
Silva, Will
Smith, Homer James
Stainforth, Robert Masterman
Stevenson, Frank Vincent
Tong, James A.
Trumpy, Daniel
Lynton, Edward D.
Venne, Keith Austin

CARTEGENA
Bennison, Allan Parnell

CUCUTA
Bowler, James William
Ring, Edgar, Raymond, Jr.

EL CENTRO
Waring, Waldo William

MEDELLIN
Botero-Arango, Gerardo

VILLAVICENCIO
Wise, Henry Francis

COSTA RICA

SAN JOSE—Brossard, Eugene E.

CUBA

HAVANA
Albear, Jesus Francisco de
Camacho, Enrique
Davies, Steven Norman
Fagginger-Auer, Willem A.
Flores, Giovanni
Gravell, Donald W.

Kirk, Howard M.
Palmer, Robert H.
Schaub, Hans Peter

DENMARK

CHARLOTTENLUND
Odum, Hilmar
COPENHAGEN—Flagler, C. W.
Gregeren, Albert Ingstrup
Sorgenfre, Theodor

VIBORG

McKee, Alexander Heberton
Norvang, Aksel

DOMINICAN REPUBLIC**TRUJILLO CITY**

Lewis, J. Whitney

ECUADOR**GUAYAQUIL**

Acheson, Cyrus Harold

QUITO

Walpole, Leonard Whitworth

EGYPT

CAIRO—Chata, Abdou Ali
Eicher, Donald B.
Esgen, W. K.
Gaenslen, George
Gubbins, Richard Eldred
Iskander, Fawzi
Iskander, Wassef
Llewellyn, John
Lucie-Smith, Geoffrey Ross
Millward, Louis George
Waite, Stephen Temple
Zimmerman, Sam

ENGLAND

BROMLEY—Lepper, G. W. S.
LONDON—Henson, F. R. S.
illing, Vincent Charles
Lees, George M.
Lehner, Ernest J.
Leyds, Louis W.
Lovely, Herbert R.
MacKay, Charles
Pyron, Gertrude Drach
Sutton, Edwin Cooper

TREDINGTON
Hutchison, Arthur G.

WESTMINSTER
Templeton, James Clark

ETHIOPIA

ADDIS ABABA—Lock John, H.

FRANCE

PARIS—de Cizancourt, Henry
Lynton, Edward D.
Migaux, Leon
Schlumberger, Marcel
Schneegans, Daniel
Sundt, Olaf Francis

ST. GAUDENS—Michel, Pierre
Morange, Andre Raymond
Perebaskine, Victor

GERMANY

BERLIN—Stille, Hans

GOLD COAST

TARKWA
Brown, James Chapman

GUAM

PACIFIC ISLANDS ENGINEERS
Alcorn, James Munrex

HAITI

PORT-AU-PRINCE
Postle, Gordon Leo

HUNGARY

BUDAPEST—Papp, Simon

INDIA

KARACHI—Baker, Ronald Isaac

PAKISTAN—Mehta, Abdul Khaliq

IRAQ

KIRKUK—McGinty, James

ITALY

FORNOVA TARO

Wiedenmayer, Carl

JAVA

BATAVIA—Hopper, Richard H.

MEXICO

CHARCAS—Wipolt, Ralph Henry

CIUDAD CAMARGO

Yzaguirre, Lauro Antonio

MEXICO CITY

Alvarez, Manuel, Jr.

Arellano, A. R. V.

Burbridge, Charles Edmunds, Jr.

Garcías, Valentine R.

Kane, William G.

Ordóñez, Ezequiel

Rummerfield, Ben F.

Thomas, James W.

Wilson, Ivan Franklin

MONTERREY

Martínez, Fidel Castilla

Pérez-F, Raul

TAMPICO—Alba y Soto, Alonso de

van Rossum, Otto

Vázquez, Andres Lopez

MOROCCO

CASABLANCA

Butticias, Pierre Hugo

PETITJEAN

Burger, Jean Jacques

RABAT

Wallace, Maurice H.

NETHERLANDS

THE HAGUE

Bagelaar, Hermanus

Bard, Richards J.

Dozy, Jean Jacques

Hegwein, Walter H.

Hemmings, H.

Kundig, Ernst

Ritter, Ernst A.

Schombel, Leonard Frederick

Schoo, Jan Hendrick

Schurmann, H. M. E.

Taverne, N. J. M.

van Gogh, F. A. A.

van Weelden, A.

WAGENINGEN—Doeglas, D. J.

NEW BRUNSWICK

FREDERICTON

Wright, William Josiah

NEW CALEDONIA

MOUMEA—Pomeyrol, Rene

NEW ZEALAND

AUCKLAND—Bossard, Leon

TIMARU

Collins, Burton Wallace

WELLINGTON—Ongley, Montague

NICARAGUA

MANAGUA—Young, W. Ford

NIGERIA

LAGOS—Burr, Ian Laurence

NOVA SCOTIA

ANTIGONISH—MacNeil, Donald J.

ONTARIO

OTTAWA

Gussow, William Carruthers

Hume, George S.

Kidd, Frederick Alexander

Muller, Jan Engelbert

Scott, James Campbell

TORONTO

Barrow, Geoffrey

Beck, August F.

Bell, A. Lyndon

Fournier, Frank Lawrence

Godefroy, Constant

Hamilton, Robert John

Hopkins, Oliver B.

Jones, Roy Meyrick Price

Link, Theodore A.

Rolf, William Albert

Springer, George Douglas

Sproule, John Campbell

Tovell, Walter Massey

Weichert, Rudolph F., Jr.

Wheeler, Orby Clinton

PALESTINE

HAIFA—Damesin, Leopold C. F.

Nasr, Sami N.

Wetzel, Rene Jacques

Williamson, Thomas F.

PANAMA

BALBOA—Arnold, Emmett L.

DIABLO HEIGHTS

Moran, Thomas Grayson

Thompson, Thomas F.

PAPUA

PORT MORESBY

Mott, William Dick

PARAGUAY

ASUNCION—Cassel, Chester

Sagnier, Fernando B.

PERSIAN GULF

BAHREIN ISLAND

Bramkamp, Richard Allen

Langham, Noel Thomas

KUWAIT

Moody, John Drummond

QATAR—Hotchkiss, Henry

PERU

LIMA—Fyfe, Douglas

Huff, Keith Frederick

McGill, Andrew K.

Moore, Edward Lionel

Parsons, Harold Ewing

Rozanski, George

Smith, Lorne Alexander

Sumner, Walton

Walton, George Goodrich

Williams, M. Dean

NEGROS

Camminati-Cortes, Luis

Dorreen, James Moore

Plucker-C., Eduardo

Stone, Benton

TALARA

MacGregor, James Donald

ZORRITOS

Verastegui-MacKee

PHILIPPINE ISLANDS

MANILA

Aycardo, Man Matthew, Jr.

Daleon, Benjamin Angel

SAN JUAN

Dunlap, John Crawford

QUEBEC

MONTREAL

Johnston, John Russell

QUEBEC—Jones, I. W.

ROUMANIA

PLOESTI-TELEAJEN

Hlauschek, Hans

SASKATCHEWAN

SASKATOON

Edmunds, Frederic Harrison

SAUDI ARABIA

DHAHRAN

Barger, Thomas Charles

Collins, Philson Delp, Jr.

Dake, Laurence Falkenstein

Harris, Treshitt Fairman

Kerr, Richard C.

Mahoney, Rober Sylvis

Reed, Irvin John

Storm, Alfred E.

SPAIN

MADRID—Bray, Vinton Arthur

SUMATRA

PALEMBANG

Barnwell, George F.

de Bruyn, Hendrik Dick

Suave, Nathaniel Bernard

SOENGEI-GERONG

Harsveldt, Hessel Murk

SWITZERLAND

BASEL—Spicher, August

Tschopp, Herman I.

Vonderschmitt, Louis

GENEVA

Poldini, Edward Maria

LAUSANNE—Gagnebin, Elie A.

ZOLLIKON

Goldschmid, Karl Theodor

SYRIA

ALEPPO

Brown, Richard Vernon

Daniel, Edgar James

Van Bellen, Robert Carel

BEYROUT—Birembaut, Arthur

Riddell, Charles Edwin

LEBANON

Gibson, Francis Alex

Wellings, Frank E.

TASMANIA

HOBART—Carey, S. Warren

TRINIDAD

PALO SECO

Wilson, Cedric Clark

POINTE-A-PIERRE

Barr, Kenneth William

Bower, Thomas Henry

Higgins, George Esmond

Kugler, Hans G.

Rohr, Karl

Suter, Hans H.

Thomas, Hallowell

POINT FORTIN

Barker, Maurice H. S.

Wooley, John Bernard

SAN FERNANDO

Boutakoff, Nicholas

Penny, Frederick W.

Sutton, Albert George A.

TURKEY

ANKARA—Bediz, Pertev I.

Lokman, Kemal

Tasman, Cevat E.

Tasman, Mehlika Isgi

VENEZUELA

BARCELONA

Chickering, Wallace Wylie

Dahm, John N.

Dawson, George Wilson

Guntz, Henry Anthony

Krumholz, Alcius John

Monaghan, Richard Joseph

Reif, George O., Jr.

Sass, Louis Carl

Walker, Edward Bullock, III

CARACAS—Aguerevere, Pedro I.

Aguerevere, Santiago E.

Alberding, Herbert

Allen, Lynn D.

Anisgard, Harry William

Bailey, Florent Houlding

Baldo, Luis Antonio

Barclay, Stewart

Benson, Don G.

Bermudez, Pedro Joaquin

Bingham, Dwight H.

Bond, Henry Lofland

Boylan, Ebert E.

Bursch, Jacobus George

Butler, John Weston, Jr.

Caan, Albert J. Z.

Cody, Marian Coffman

Conrad, Peter Paul

Couch, Robert Garwood

Crests, Chester M.

Crickmay, Geoffrey William

Cullison, James S.

Dallmus, Karl F.

Davis, John Roland

de Civrieux, Jean Marc Sellier

de Juana, Clemente Gonzalez

Denling, Joseph Horace

Desjardins, Louis Hesea

De Sola, Oswaldo

Dodson, Louis Garner

Doell, Edward Charles

Fichter, Hans Jakob K.

Floyd, Florin W.

Fowler, Charles W., Jr.

Freie, A. J.

Fricke, Kenneth Stewart

Funkhouser, Harold John

Geyer, Robert Lee

Gillingham, William James

Gorman, Joseph Michael

Gray, Roe Austin

Guillaumin, Jacques, Jr.

Haight, Harold W.

Hale, Francis Ayers

Henry, Leonard W.

Heyl, George Richard

Hill, Robert Grant

Horton, Harold M.

Horton, Jack Ogilvie

Hottinger, Arthur Felix

Howard, Jesse James

Jacobsen, Peter, Jr.

Johnson, Hamilton McKee

Judson, Jack Finlay

Kaye, M. Kamen

Kehrer, Louis

Klecker, John Benedict

Knight, Oliver B.

Krum, William M.

LeRoy, Frank Leon

Lewis, George Russell

Lockett, George L.

Marquez G., Pedro Jesus

Martin, Bethea Allen

Martin, Francis I.

Martin, V. Del

McArthur, Donald

McLay James Harold

McMillen, Ralph Eugene

Mencher, Ely

Merrill, William Raymond

Miller, John Bakken

Miranda-Ruiz, Leandro

Moore, Bernard Nettleton

Morrison, Robert P.

Muhlemann, Rudolf

Otamendi-Blanco, Paul

MEMBERS

499

Pantin, Jose Henrique
 Parr, Arnold Foster
 Patterson, Joseph M.
 Payne, Arthur Lawrence
 Pfeiffer, Guilford Clarence
 Poulin, John A.
 Probst, David Arthur
 Regan, John H.
 Renz, Hans Herman
 Rincones, Carlos Antonio V.
 Robie, Robert Hodges
 Rodriquez E., Guillermo
 Saubert, Robert William
 Schlatter, Lucas Eugen
 Scott, Gerald Hugh
 Severson, George A.
 Shields, James A.
 Sinclair, John Taylor, Jr.
 Sohlberg, Rudolph Gust
 Spencer, Charles Grason
 Staeger, Dietrich

Sugar, Ernst
 Sutton, Frederick A.
 Taylor, Spence Tomlinson
 Thalmann, Hans E.
 Thiebaut, Charles Emile
 Thoms, Harold Wayne
 Tribbey, Roy Jackson, Jr.
 Wallis, William E.
 Weisbord, Norman E.
 Wenberg, Edwin Hugo
 Wheeler, Russell Benson
 Wilcox, Stanley William
 Wilson, Joe G.
 Wilson, Thomas C.
 Winkler, Virgil Dean
 Young, Raymond Owen
 Zaikowsky, Michael Wladimir
 Zuloaga, Guillermo
 CARIPITO
 Ackerman, Edgar Dumont
 Howard, Douglas Duke

Loeffler, Richard John
 Sawyer, Joseph Herbert
 Seals, Wilburn Hale
 Simons, James A.
 Taylor, Henry Stanley, Jr.
 Walls, Joseph, Jr.
 Volton, James S.
 JUSEPIN—Becker, Leroy Everett
 White, Gordon Ashbridge
 LA SALINA
 Fenichell, Melvin M.
 MARACAIBO
 Breitenstein, Robert S.
 Butcher, Walter William
 Crays, Glenn Edward
 Crews, William Edward
 Current, Andrew Max
 Davis, Irion Grady
 Dominguez-D., Jose Rafael
 Douglas, John G.

Edwards, Kenneth L.
 Finley, Emmet Atkins
 Gester, Peter Warren
 Hulsewe, Gerard Jan
 Johnson, Frank Walker
 Lamon, Robert Scott
 Martin, Rudoli
 McGrath, Patrick Bernard
 Myers, LeMoyn Ward
 Netick, Joe
 Norbistrath, Hans
 Ramsden, Charles Hugo
 Ratway, Joseph
 Renz, Hans Hermann
 Roberts, Homer Eugene
 Rogers, Harry Samuel
 Rosales-W., Cesar M.
 Weber, David M.
 Whipple, G. Leslie
 MATURIN—Borger, Harvey D.

FINANCIAL STATEMENT FOR THE YEAR ENDED DECEMBER 31, 1947
THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
BALANCE SHEET
AT DECEMBER 31, 1947

ASSETS	Total	General Fund	Publication Fund	Research Fund	Powers Memorial Fund	Life Membership Fund
CURRENT ASSETS:						
Demand deposits.....	\$ 53,592.87	\$ 33,142.86	\$16,345.61	\$3,268.94	\$ 435.46	\$ 400.00
Accounts receivable less reserve, \$971.53.....	2,874.49	2,799.09	75.40	—	—	—
Accrued interest receivable less reserve, \$850.41.....	563.93	297.98	130.21	1.45	107.29	—
TOTAL CURRENT ASSETS.....	<u>\$ 57,004.29</u>	<u>\$ 36,239.93</u>	<u>\$16,551.22</u>	<u>\$3,270.39</u>	<u>\$ 542.75</u>	<u>\$ 400.00</u>
INVESTMENTS at cost (market value \$165,463.33).....	104,491.32	122,774.97	27,862.14	1,154.21	9,300.00	2,800.00
PUBLICATIONS (see note below).....	17,761.47	15,581.21	2,186.26	—	—	—
FURNITURE AND FIXTURES less reserve, \$6,094.47.....	1.00	1.00	—	—	—	—
DEFERRED CHARGES.....	4,121.73	2,861.73	1,260.00	—	—	—
	<u>\$243,379.81</u>	<u>\$177,458.84</u>	<u>\$47,853.62</u>	<u>\$5,024.60</u>	<u>\$9,842.75</u>	<u>\$3,200.00</u>
LIABILITIES AND SURPLUS						
CURRENT LIABILITIES:						
Accounts payable.....	\$ 4,711.02	\$ 4,711.02	\$ —	\$ —	\$ —	\$ —
Accrued printer's charges.....	2,380.20	1,120.20	1,260.00	—	—	—
TOTAL CURRENT LIABILITIES.....	<u>\$ 7,091.22</u>	<u>\$ 5,831.22</u>	<u>\$ 1,260.00</u>	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>
DEFERRED INCOME (membership dues and subscriptions \$37,180.10, advertising \$1,085.10).....	38,265.20	38,265.20	—	—	—	—
SURPLUS (per attached statement).....	198,023.39	133,362.42	46,593.62	5,024.60	9,842.75	3,200.00
	<u>\$243,379.81</u>	<u>\$177,458.84</u>	<u>\$47,853.62</u>	<u>\$5,024.60</u>	<u>\$9,842.75</u>	<u>\$3,200.00</u>

NOTE: Publications, exclusive of excessive quantities and obsolete issues, are priced as follows:

Bulletins:

1947 issues at cost

1943 to 1946 issues at \$.50 each but not exceeding 100 copies of any one issue

Volumes:

At or below cost but not exceeding 100 copies of any one volume

Other publications:

At cost

ASSOCIATION ROUND TABLE

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THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS STATEMENT OF INCOME AND SURPLUS FOR THE YEAR ENDED DECEMBER 31, 1947

	Total	General Fund	Publication Fund	Research Fund	Powers Memorial Medal Fund	Life Membership Fund
INCOME:						
Membership dues for 1947 (4,138 active, 1,251 associate, 1 life).....	\$ 51,018.00	\$ 50,818.00	\$ —	\$ —	\$ —	\$ 200.00
Less: \$6.00 per member transferred to "Income from Publications".....	32,340.00	32,340.00	—	—	—	—
Income from publications (per attached statement).....	\$ 18,678.00	\$ 18,478.00	\$ —	\$ —	\$ —	\$ 200.00
Income from securities.....	20,340.78	17,448.87	3,091.91	—	—	—
Profit from sale of securities.....	6,492.78	5,302.20	886.68	17.40	232.50	—
Recovery of accounts previously charged off.....	2,790.70	1,106.92	1,689.78	—	—	—
Miscellaneous.....	480.07	435.07	45.00	—	—	—
	295.33	295.33	—	—	—	—
	\$ 49,083.66	\$ 42,026.39	\$ 5,797.37	\$ 17.40	\$ 232.50	\$ 200.00
EXPENSES (exclusive of expenses charged to "Income from Publications"):						
Salaries.....	\$ 15,521.10	\$ 15,521.10	\$ —	\$ —	\$ —	\$ —
Postage.....	3,376.20	3,376.20	—	—	—	—
Office rent.....	3,971.50	3,971.50	—	—	—	—
Miscellaneous office supplies and expenses.....	3,164.62	3,164.62	—	—	—	—
Taxes.....	450.85	450.85	—	—	—	—
Provision for bad debts.....	744.23	744.23	—	—	—	—
Traveling expense.....	175.24	175.24	—	—	—	—
Research projects.....	3,475.99	3,475.99	—	—	—	—
Investment counsel.....	400.00	400.00	—	—	—	—
Audit fee.....	300.00	300.00	—	—	—	—
Expense of moving office.....	1,137.83	1,137.83	—	—	—	—
Convention expense—net.....	508.73	508.73	—	—	—	—
Donation to Soc. Econ. Paleontologists and Mineralogists.....	2,000.00	2,000.00	—	—	—	—
Medals and awards.....	377.11	128.82	—	—	248.29	—
Miscellaneous.....	783.85	420.76	363.09	—	—	—
	\$ 36,393.25	\$ 35,781.87	\$ 363.09	\$ —	\$ 248.29	\$ —
NET INCOME.....	\$ 12,600.41	\$ 7,144.52	\$ 5,344.28	\$ 17.40	\$ (15.79)	\$ 200.00
SURPLUS AT DECEMBER 31, 1946.....	185,332.08	126,217.90	41,249.34	5,007.20	9,858.54	3,000.00
SURPLUS AT DECEMBER 31, 1947.....	\$198,023.39	\$133,362.42	\$46,593.62	\$5,024.60	\$9,842.75	\$3,200.00

() Denotes loss.

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
STATEMENT OF INCOME FROM PUBLICATIONS
FOR THE YEAR ENDED DECEMBER 31, 1947

	Total	General Fund	Publication Fund
INCOME:			
Membership dues transferred.....	\$32,340.00	\$32,340.00	
Bulletin subscriptions.....	7,716.30	7,716.30	
Advertising—net.....	22,520.10	22,520.10	
Sales of bound volumes and special publications:			
Bound volumes of Bulletins.....	\$ 2,900.20	\$ 2,900.20	
Back numbers of Bulletins.....	2,705.87	2,705.87	
Possible Future Oil Provinces of U. S. and Canada.....	398.60	398.60	
Tectonic Map of the United States.....	1,323.00	1,323.00	
Index of 1917-1945.....	6,077.00	6,077.00	
Directory Geol. Material in North America.....	223.50	223.50	
Geology of Tampico Region.....	294.35		\$ 294.35
Tectonic Map of Southern California.....	37.05		37.05
Miocene Stratigraphy of California.....	504.00		504.00
Source Beds of Petroleum.....	182.75		182.75
Stratigraphic Type Oil Fields.....	812.55		812.55
Structure of Typical American Oil Fields, Vols. I-II.....	6,632.00		6,632.00
Other publications.....	407.90	464.90	3.00
	<u>22,618.77</u>	<u>14,153.07</u>	<u>\$8,465.70</u>
	\$85,195.17	\$76,729.47	\$8,465.70
COSTS AND EXPENSES:			
Proportion of managers' salaries.....	\$ 9,750.00	\$ 9,750.00	
Editorial-secretary's salary and editor's expenses.....	2,880.00	2,880.00	
Printing Bulletins.....	32,914.84	32,914.84	
Engraving.....	3,233.75	3,233.75	
Stencil corrections and mailing.....	106.61	106.61	
Bulletin mailing and expense.....	1,383.94	1,383.94	
Copyright fees.....	24.00	24.00	
Special insert charges.....	2,739.01	2,739.01	
Binding Volume XXX (1946).....	912.59	912.59	
Reprints.....	1,383.64	1,383.64	
Printing Directory Geol. Material in North America.....	290.08	290.08	
Printing Possible Future Oil Provinces of U. S. and Canada.....	506.89	506.89	
Printing Index of 1917-1945.....	12,308.45	12,308.45	
Printing Tectonic Map of the United States.....	1,999.32	1,999.32	
Printing Structure of Typical American Oil Fields, Vols. I-II.....	4,777.50		\$4,777.50
Miscellaneous.....	13.57	13.57	
	<u>\$75,224.19</u>	<u>\$70,446.69</u>	<u>\$4,777.50</u>
Adjustment for (increase) decrease in inventory of Publications	(10,369.80)	(10,966.00)	596.20
	<u>\$64,854.39</u>	<u>\$59,480.60</u>	<u>\$5,373.79</u>
NET INCOME FROM PUBLICATIONS.....	<u>\$20,340.78</u>	<u>\$17,248.87</u>	<u>\$3,091.91</u>

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
CERTIFICATE OF INDEPENDENT PUBLIC ACCOUNTANTS

*To the Executive Committee
of the American Association of Petroleum Geologists:*

We have examined the balance sheet of THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS at December 31, 1947, and the statement of income and surplus for the year then ended, have reviewed the system of internal control and the accounting procedures of the Association and, without making a detailed audit of the transactions, have examined or tested accounting records of the Association and other supporting evidence, by methods and to the extent we deemed appropriate. Our examination was made in accordance with generally accepted auditing standards and included all procedures which we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet and statement of income and surplus present fairly the position of THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS at December 31, 1947, and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

ARTHUR YOUNG & COMPANY

TULSA, OKLAHOMA
January 28, 1948

FINANCIAL STATEMENT FOR THE YEAR ENDED DECEMBER 31, 1947

SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS
BALANCE SHEET
AT DECEMBER 31, 1947

ASSETS	
CURRENT ASSETS:	
Demand deposits.....	\$ 8,089.84
Savings deposit.....	2,299.44
Accounts receivable less reserve, \$23.88.....	79.25
Total current assets.....	\$10,468.53
PUBLICATIONS:	
Journals of Paleontology:	
Issued prior to 1947—23,646 journals at \$.50 each (3,961 complete volumes).....	\$11,823.00
Issues 1 to 6 of 1947—1,245 journals at cost.....	1,341.41
Journals of Sedimentary Petrology:	
Issued prior to 1947—3,850 journals at \$.50 each (1,213 complete volumes).....	1,790.00
Issues 1, 2, and 3 of 1947—344 journals at cost.....	200.59
Total.....	15,155.00
FURNITURE AND FIXTURES less reserve, \$493.34.....	47.09
	<u>\$25,670.62</u>
LIABILITIES AND SURPLUS	
CURRENT LIABILITIES:	
Accounts payable.....	\$ 1,442.58
Amount payable to Paleontological Society.....	1,186.36
TOTAL CURRENT LIABILITIES.....	\$ 2,628.94
DEFERRED INCOME:	
Subscriptions to journals.....	\$ 2,138.83
Membership dues for 1948 and 1949.....	1,444.87
Total.....	3,583.70
SURPLUS (per attached statement).....	19,457.98
	<u>\$25,670.62</u>

SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS
STATEMENT OF INCOME AND SURPLUS
FOR YEAR ENDED DECEMBER 31, 1947

INCOME:

Membership dues and subscriptions:		
Journal of Paleontology and Sedimentary Petrology.....	\$ 904.00	
Journal of Paleontology.....	3,873.60	
Journal of Sedimentary Petrology.....	1,451.90	\$ 6,229.50
Sales of back numbers:		
Journal of Paleontology.....	\$1,893.80	
Journal of Sedimentary Petrology.....	775.50	2,669.30
Sales of plates and reprints.....		382.41
Advertising.....		68.69
Donation from The American Association of Petroleum Geologists....		2,000.00
Miscellaneous.....		22.82
		<u>\$11,372.72</u>
Less: Proportion of income accrued to Paleontological Society.....		1,186.36
		<u>\$10,186.36</u>

COSTS AND EXPENSES:

Cost of printing:		
Journal of Paleontology.....	\$4,580.40	
Journal of Sedimentary Petrology.....	1,174.14	
	<u>\$5,754.54</u>	
Clerical salaries.....	1,230.00	
Office supplies and expenses.....	309.84	
Office rent.....	598.00	
Expense of moving office.....	194.40	
Insurance and bond.....	54.55	
Postage, telegraph, and delivery expense.....	386.88	
Audit fee.....	100.00	
Taxes.....	29.24	
Depreciation.....	54.04	
Miscellaneous.....	50.95	
	<u>\$8,762.44</u>	
Adjustment for decrease in inventory of publications.....	690.11	9,452.55
		<u>\$ 733.81</u>
NET INCOME.....		18,724.17
SURPLUS AT DECEMBER 31, 1946.....		
SURPLUS AT DECEMBER 31, 1947.....		<u>\$19,457.98</u>

SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS
CERTIFICATE OF INDEPENDENT PUBLIC ACCOUNTANTS

To the Council

of Society of Economic Paleontologists and Mineralogists:

We have examined the balance sheet of **SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS** at December 31, 1947 and the statement of income and surplus for the year then ended, have reviewed the system of internal control and the accounting procedures of the Society and, without making a detailed audit of the transactions, have examined or tested accounting records of the Society and other supporting evidence, by methods and to the extent we deemed appropriate. Our examination was made in accordance with generally accepted auditing standards and included all procedures which we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet and statement of income and surplus present fairly the position of **SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS** at December 31, 1947, and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

ARTHUR YOUNG & COMPANY

TULSA, OKLAHOMA
January 28, 1948

JOINT ANNUAL MEETING, SHIRLEY-SAVOY HOTEL,
DENVER, APRIL 26-29THOMAS S. HARRISON¹ AND CLARENCE E. MANION²
Denver, ColoradoAMERICAN ASSOCIATION OF
PETROLEUM GEOLOGISTS
EXECUTIVE COMMITTEECarroll E. Dobbin, President
Earl B. Noble, Past-President
George S. Buchanan, Vice-President
J. V. Howell, Secretary-Treasurer
Clarence L. Moody, EditorSOCIETY OF ECONOMIC PALEONTOLOGISTS
AND MINERALOGISTS
COUNCILJames A. Waters, President
F. W. Rolshausen, Past-President
John R. Sandidge, Past-President
William A. Krumbein, Vice-President
Henryk B. Stenzel, Secretary-TreasurerSOCIETY OF EXPLORATION GEOPHYSICISTS
EXECUTIVE COMMITTEECecil H. Green, President
J. J. Jakosky, Past-President
L. L. Nettleton, Vice-President
T. A. Manhart, Secretary-Treasurer
M. King Hubbert, EditorROCKY MOUNTAIN ASSOCIATION OF GEOLOGISTS
COUNCILClarence E. Manion
PresidentLaurence Brundall
First Vice-President
K. C. Forcade
Secretary-TreasurerStanley W. Lohman
Second Vice-President

Robert McMillan and Rodger F. Rhoades, Councillors-at-Large

CONVENTION ARRANGEMENTS

Thomas S. Harrison
General ChairmanArthur E. Brainerd
General Vice-Chairman

COMMITTEE CHAIRMEN AND CO-CHAIRMEN

Technical Program, A.A.P.G.

N. W. Bass—R. L. Heaton

Technical Program, S.E.P.M.

J. Harlan Johnson

Technical Program, S.E.G.

C. A. Heiland

Entertainment

Clarence E. Manion—K. L. Gow

Exhibits

H. E. Christensen—C. R. McKnight

Field Trips

J. W. Vanderwilt—F. M. Van Tuyl

Finance

Harry W. Osborne—J. M. Kirby

Hotels and Housing

Chas. S. Lavington—Laurence Brundall

Publicity

H. M. Crain—R. H. Volk

Reception

E. W. Scudder—V. Z. Smith

Registration

Robert McMillan—A. W. Cullen

Service

K. C. Forcade—E. G. Hurd

Transportation

George R. Downs—J. H. Turner

Women's Committee

Mrs. J. Harlan Johnson—Mrs. A. E. Brainerd

ANNOUNCEMENT

The 33d annual meeting of the American Association of Petroleum Geologists will be held at the Shirley-Savoy Hotel, Denver, Colorado, on April 26-29, 1948. The 18th annual meeting of the Society of Exploration Geophysicists and the 22d annual meeting of the Society of Economic Paleontologists and Mineralogists will be held concurrently. The Rocky Mountain Association of Geologists cordially extends an invitation to all Association and Society members, and their wives, to attend the meetings.

¹ General chairman, convention arrangements.² President, Rocky Mountain Association of Geologists.

Returns from preliminary cards indicate an even larger attendance at the Denver meeting than at the Los Angeles meeting last year. Your hosts are happy to have this large response for it means to them that you all like to come to Denver. It also indicates the importance the Rocky Mountain region has attained since the last meeting here in 1942. However, such a large attendance means a great deal of work for our Hotels and Housing Committee and it will need your full cooperation in making hotel reservations and acceptance of available space. In addition to the several larger hotels, the committee must utilize many small hotels, some of which will be several blocks from the headquarters. We know that exploration geologists, paleontologists, and geophysicists are highly adjustable individuals and accustomed to taking conditions as they are. We will strive to make up in good old western hospitality whatever we lack in accommodations.

A feature of the 1942 meeting that was greatly enjoyed by all our guests was the white April shower arranged by the Service Committee. In an effort to repeat this feature, the committee is now negotiating an agreement with Nevada and Utah, whereby those states will not de-ice our clouds during the period of the meeting.

TECHNICAL PROGRAM

The technical program will include papers of regional scope pertaining to the Rocky Mountain area, except in a few cases where local areas or fields are of especial interest to geologists at the present time. Other papers of general interest will also appear. From 20 to 30 minutes have been allotted for presentation, with an additional 10 or 15 minutes for discussion.

The technical program will begin on Monday evening, April 26, with a paper by V. F. Parry, of the United States Bureau of Mines, titled, "Prospects for Conversion of Western Coals to Synthetic Liquid Fuel." Tuesday morning will be devoted to the opening of the convention, the presidential addresses for the three societies, and to the various awards. The afternoon session will include Mid-Continent papers on the occurrence of oil in the Arbuckle and Ellenburger formations, on the "golden trend" of McLain and Garvin counties, Oklahoma, and on the Leduc oil field of Alberta, Canada.

The second day, Wednesday, April 28, and perhaps extending into the third, will be devoted to a symposium on the Rocky Mountain region, in which general papers will be given on the orogeny of the Front Range, and on a résumé of oil-finding. Regional and statewide papers will be given on the stratigraphy and paleogeography of Colorado, Wyoming, Utah, and Montana, and adjacent areas.

On Thursday, April 29, a variety of papers will be given, on several localities outside the Rocky Mountain area, including one of the Permian basin and one concerned with gas resources. Several short papers are planned on the geology, paleontology, and oil prospects of Naval Petroleum Reserve No. 4 in northern Alaska.

The annual business meeting for the A.A.P.G. is scheduled for Thursday also.

On Wednesday afternoon, the S.E.P.M. will hold a meeting of its Research Committee, and the remainder of the day will be devoted to a symposium on Dwarf Faunas. On Thursday, April 29, general and foreign papers will be presented in the morning, and domestic papers in the afternoon. Meetings will be held at the Cosmopolitan Hotel.

Meetings of the S.E.G. will begin Monday morning, April 26, and continue through Wednesday, April 28. Wednesday papers are in the nature of a symposium on the application of geophysics to mining prospecting. On Thursday morning several buses will be chartered to take S.E.G. members to the Federal Center in Denver for an inspection of the laboratories of the Reclamation Bureau and the Topographical Branch of the U.S.G.S. and other facilities. The group will have lunch at the Federal Center after which the buses will take them to Golden, Colorado, where they will inspect the geophysical laboratories of the Colorado School of Mines. As an added feature of the trip, depending on the wishes

of the group, there will also be a brief inspection of the Coors Brewery Plant. The group will then return to Denver in time for cocktails. The price of the trip including lunch will be \$3.00 per person. All S.E.G. members who wish to join this inspection trip are asked to notify the Registration Committee at the time they return their requests for hotel reservations. Tickets for the trip will be available at the registration desk in the Shirley-Savoy Hotel. Meetings of the S.E.G. will be held in the Cosmopolitan Hotel.

GENERAL OUTLINE OF PROGRAM

Sunday, April 25	Arrival of special trains.
Monday, April 26	Joint registration at Shirley-Savoy Hotel. A.A.P.G. and S.E.G. committee meetings.
	Pre-convention field trip along the foothills of the Front Range between Golden and Boulder.
Night	S.E.G. technical sessions.
	"Prospects for Conversion of Western Coals to Synthetic Liquid Fuel," by V. F. Parry, United States Bureau of Mines.
Tuesday, April 27	Joint session. Presidential addresses and awards.
A.M.	Joint session. Papers on Mid-Continent fields. General geophysical papers.
P.M.	
Wednesday, April 28	A.A.P.G. Symposium on the Rocky Mountain region.
A.M.-P.M.	S.E.G. Technical papers.
	S.E.P.M. Research committee meeting.
P.M.	S.E.P.M. Symposium on Dwarf Faunas.
Thursday, April 29	A.A.P.G. Geology and development papers.
A.M.-P.M.	Short papers on the Naval Petroleum Reserve No. 4, Northern Alaska.
	Annual business meeting.
	S.E.G. Inspection trips.
A.M.	S.E.P.M. General and foreign papers.
P.M.	S.E.P.M. Domestic papers.
Night	Dinner and dance at the Shirley-Savoy Hotel.
Friday, April 30	Post-convention field trips.
	No. 2. Two-day field trip along the Front Range in the vicinity of Colorado Springs, Canon City, and the Royal Gorge.
	No. 3. Three-day field trip to Glenwood Springs, oil-shale development at Rifle, and Leadville district.

JOINT AND A.A.P.G. TECHNICAL SESSIONS—TENTATIVE

APRIL 26, EVENING

1. V. F. Parry, U. S. Bureau of Mines, "Prospects of Conversion of Western Coals to Synthetic Liquid Fuel"

APRIL 27, MORNING

1. Convention called to order. Star Spangled Banner
2. C. E. Manion, Address of Welcome
3. J. A. Waters, S.E.P.M. Presidential Address
4. C. H. Green, S.E.G. Presidential Address
5. Carroll E. Dobbin, A.A.P.G. Presidential Address
6. Awards and Honorary Memberships
7. Announcements

AFTERNOON

1. F. H. Lahee, "Statistics of Exploratory Drilling, 1947"
2. J. G. Bartram, E. F. Shea, and W. C. Imbt, "The Occurrence of Oil in the Arbuckle and Ellenburger Formations of the Mid-Continent Area"
3. R. M. Swesnik, "The Golden Trend of McClain and Garvin Counties, Oklahoma"
4. D. B. Layer, "The LeDuc Oil Field, Alberta, a Devonian Coral Reef Discovery"

EVENING

1. J. T. Duce, "Middle East Oil Fields, Their Reserves, etc."

APRIL 28, MORNING

1. M. L. Krueger, "Résumé of Oil-Finding in Rocky Mountain Region"
2. C. J. Hares, "Orogeny of the Rockies"
3. R. L. Heaton, "Mesozoic and Late Paleozoic History of Colorado and Adjacent Areas"
4. H. D. Thomas, "Regional Stratigraphy and Structure of Wyoming"

AFTERNOON

1. E. M. Spieker, "Orogenic Record of Central Utah"
2. A. A. Baker, J. W. Huddle, D. M. Kinney, "Paleozoic Geology of the North and West Sides of the Uinta Basin, Utah"
3. L. L. Sloss, "Tectonic Control of Paleozoic Sedimentation in the Montana Area"

APRIL 29, MORNING

1. J. M. Hills, "Regional Paleogeography of the Northern Part of the Permian Basin of West Texas and New Mexico"
2. A. J. Eardley, "Paleotectonic and Paleogeologic Maps of the Central and Western Part of North America"
3. G. F. Moulton, "Gas for the Future"
4. George Gates, "General Geologic and Geographic Pictures of Naval Petroleum Reserve No. 4, Northern Alaska"
5. T. G. Payne, "Stratigraphic Facies Analysis in Naval Petroleum Reserve No. 4, Northern Alaska"

AFTERNOON

1. H. W. Scott, "Age of the Amsden Formation in Montana and Wyoming"
2. Max W. Ball, "Petroleum Supply Situation"
3. Hall Taylor, "Stratigraphic Studies in Ethiopia"
4. D. M. Delo, "The Geologist in the Armed Services, World War II"
5. Annual Business Meeting

EVENING

Western Dinner and Dance

FIELD TRIPS

One pre-convention field trip (No. 1) and two post-convention trips (No. 2 and No. 3) are planned.

No. 1. This pre-convention field trip is planned in the foothills along the Front Range from Boulder to Golden on Monday, April 26. Warren O. Thompson, of the University of Colorado, will lead the group in the Boulder area, and F. M. Van Tuyl, of the Colorado School of Mines, in the Golden area.

No. 2. One post-convention trip will leave Denver at 8:00 A.M., Friday, April 30, returning to Denver late in the afternoon of Saturday, May 1. The first day, Friday, will be devoted to a study of the stratigraphic features in the Colorado Springs area, and the night will be spent at Colorado Springs. The second day, Saturday, will cover the geology from Colorado Springs, including the Florence area, to Canon City and the Royal Gorge, returning to Denver in the late afternoon.

Those desiring to go east or south from Colorado Springs at the end of the first day or second day may do so.

No. 3. A second post-convention trip will leave Denver at 8:00 A.M., Friday, April 30, and return to Denver early Sunday evening, May 2. Total distance of travel: 525 miles. The first day will include a part of the Denver basin, the Front Range, the Mosquito Range and the pre-Cambrian to Cretaceous formations along the Eagle River and Colorado River to Glenwood Springs, where the night will be spent. The morning of the second day, Saturday, will be at the mine and retort of the Oil-Shale Demonstration Plant of the United States Bureau of Mines. In the afternoon the trip will proceed *via*

Gilman and Tennessee Pass to Leadville, where the second night will be spent. On the third and last day, Sunday, the pre-Pennsylvanian formations on Trout Creek and the interesting structural features in South Park will be studied. Return to Denver will be over Kenosha Pass and across Front Range.

Those desiring to proceed west from Glenwood Springs at the end of the first day, or after the visit to the Oil-Shale Demonstration Plant on the second day, may do so.

Transportation is planned by motor bus and costs will be prorated and paid by each person attending. Problems related to transportation and hotel accommodations make it necessary to make definite reservations by those who wish to attend either the No. 2 or No. 3 post-convention field trip. All members will receive cards under separate cover, provided with space for field-trip reservations. Please indicate on the card whether or not you plan to participate.

EXHIBITS

Desirable advertising space for exhibits of equipment, maps and services used in petroleum exploration is available in the Empire Room of the Shirley-Savoy Hotel, across the lobby from the technical meetings. Parties interested in purchasing space and arranging for exhibits should immediately write to H. E. Christensen, Box 2100, Denver 1, Colorado.

ENTERTAINMENT

The only planned entertainment, other than ladies entertainment, is a western dinner and dance in the Lincoln Room of the Shirley-Savoy Hotel on Thursday night, April 29. The Rocky Mountain region being the last great frontier for oil exploration, members and their wives may leave their tuxedos and evening dresses at home and bring their frontier clothes (less expensive too!).

Entertainment for the visiting ladies is being planned by a group under the direction of Mrs. J. Harlan Johnson. On Monday, April 26, the ladies may participate with the men, in a short field trip to the mountains. On Tuesday, April 27, a visit to the Colorado Museum of Natural History is planned, together with a reading by Louise Mullins in the Phipps Auditorium. On Wednesday, April 28, the ladies will be guests at "My Ladies Show Under the Clock in the Tower," followed by a tea honoring the wives of the presidents. Thursday night the annual dinner and dance will be held in the Lincoln Room of the Shirley-Savoy Hotel.

Mr. Arthur M. Oberfelder of the Oberfelder-Slack Management, has announced that a select cast of the Metropolitan Opera Association will appear in Denver, Monday and Tuesday, April 26 and 27. Operas presented will be *Aida*, *La Bohème*, and *Carmen*. Reservations could not be delayed until this present announcement is received by members, and Mr. Oberfelder, with the help of the Ladies Entertainment Committee, has been kind enough to send announcements and requests for reservations to those members who have indicated on the preliminary cards, their intention to attend the meeting.

ALUMNI LUNCHEONS

A number of alumni luncheons will be arranged for groups large enough to make a special luncheon advisable. Those wishing to participate in alumni luncheons should so indicate on cards that will be later received.

HOTELS AND HOUSING

The Housing Committee has obtained commitments for comfortable rooms from all of the better and most conveniently located hotels. A form has been mailed to all members, for applying for definite hotel reservations. When this form is received it should be filled out and immediately mailed to the Denver Convention and Visitors Bureau.

Those who can and wish to arrange for their own housing in private homes are encouraged to do so.

Try to avoid requesting a single room. If possible, team up with another person and request a double room. Because of the limited number of single rooms available, you will be more certain of securing accommodations if you will share a room. Should you agree to share a room and are unable to find a partner, the Housing Committee will assign you a partner.

Your arrival on Sunday, April 25, will save you much confusion and will relieve the inevitable congestion expected on Monday, April 26.

DENVER HOTELS

Rates on double rooms with bath

SHIRLEY-SAVOY	\$2.75 to \$6.00	DESOTO	\$3.50 to \$5.00
(Headquarters)		KENMARK	\$5.00 to \$6.00
ADAMS	\$4.50 to \$6.00	OLIN	\$5.00 to \$7.00
ALBANY	\$3.85 to \$8.00	OXFORD	\$4.50 to \$7.00
ARGONAUT	\$5.00 to \$8.00	PARK LANE	\$8.00 to 10.00
AUDITORIUM	\$5.00 to \$6.00	(Excellent hotel in residential section)	
BROWN PALACE	\$7.70 to \$9.00	PLAZA	\$5.00 to \$6.00
COLORADO	\$5.00 to \$6.00	ROOSEVELT	\$3.00 to \$5.50
CORY	\$4.00 to \$5.00	SEARS	\$6.50 to \$7.50
COSMOPOLITAN	\$7.50 to 11.00		

Correspondence addressed to any of the designated hotels will be referred directly to the Housing Committee. When all the available rooms at these hotels are taken, the committee will make assignments at other well located and comfortable hotels.

Some of the country's finest motor courts are to be found in Denver and suburbs. If you are driving, perhaps you will prefer this type of accommodation. The Housing Committee will secure reservations with one of the best motor courts if you indicate this on the application form. Advance deposits of \$10 will be necessary to hold motor-court reservations but this should not be paid until you receive confirmation directly from the court and it should then be sent to the court and not to the Convention Bureau.

SPECIAL TRAIN FROM HOUSTON

The Houston Geological Society, with the cooperation of the Dallas Geological Society and the Fort Worth Geological Society, is sponsoring a deluxe Special Train to the 33d annual meeting of the A.A.P.G., in Denver, Colorado, April 26-29. The special train, with members aboard from the Gulf Coast region, will leave Houston over the Burlington Lines Saturday, April 24, at approximately 2:30 P.M., and is scheduled to arrive in Denver, Colorado, Sunday, April 25, at 3:30 P.M. Special cars from other points in Texas will be picked up *en route*. Printed itineraries, giving detailed schedules of trains making connections with the special train, will be mailed to members living in Alabama, Arkansas, Florida, Louisiana, Mississippi, and Texas.

No special train will be run on the return trip and those making the return trip may do so by the Burlington, Santa Fe, or Missouri Pacific Lines. Return by any route other than Burlington may be made at a small additional cost.

It is suggested that those receiving the printed itinerary discuss with their local ticket agent their route of return. A round-trip ticket from Houston and return including lower berth and federal tax will cost approximately \$91.95. Compartments and drawing-room accommodations will be slightly higher. Fares from all principal points will be quoted in the printed itinerary now being mailed.

It should be emphasized that no one connected with the special train has any connec-

tions with the Denver Hotel Reservations Committee of the A.A.P.G. Individual members should continue to make Denver hotel reservations through the National Housing Committee, attention C. S. Lavington and Laurence Brundall.

It is suggested that all members read the joint meeting announcement in this issue of the *Bulletin* for all details pertaining to Denver hotel reservations. A hotel room reservation card has been mailed each member for return to the Denver committee.

The Burlington officials have promised the best available type of equipment and motive power for this special train, including a stream-line diesel-electric locomotive, the "Vista-Dome" (the penthouse car with glass-enclosed dome to permit unrestricted view of the countryside), full-car lounge with piano, latest type diners and good Pullman cars. The special train itself will be limited to approximately 18 cars and any overflow or late reservations will move on the regularly scheduled Burlington trains. It is therefore important that you make your reservations early if you wish to have accommodations on the special train.

The Houston Geological Society extends a cordial invitation to all members of the A.A.P.G. living in Alabama, Arkansas, Florida, Louisiana, Mississippi, and Texas to join us on this special train.

CARLTON D. SPEED, JR.

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(TERM OF OFFICE TO BEGIN AT END OF ANNUAL MEETING, APRIL, 1948)



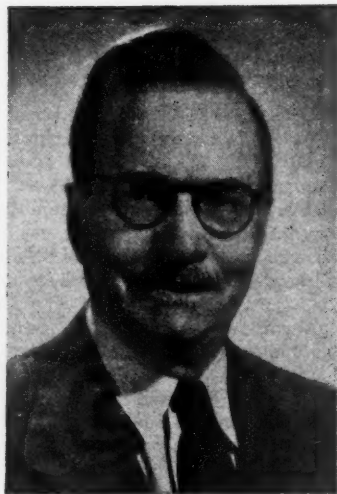
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AT HOME AND ABROAD

NEWS OF THE PROFESSION

Announcement has been made of the creation of four \$1,000 graduate fellowships leading to the Master's degree at the University of Wichita by the University of Wichita Foundation for Industrial Research. W. M. Jardine, president of the University, and W. B. Burnett, director of the Foundation stated in their announcement that the fellowships are being awarded to stimulate graduate study and encourage industrial research pertinent to the activities of the Wichita area. Graduates of accredited colleges and universities are eligible for the fellowships which will be awarded on the basis of merit. The recipients will be awarded \$1,000 plus an allowance for tuition and fees. The University of Wichita will remunerate the fellows for any part-time teaching or assisting which may be required. The awards are to be made in the fields of aeronautical engineering, chemistry, petroleum geology, and bacteriology. The thesis subjects must pertain to problems of importance to the Wichita area. Complete information on the awards may be obtained from the Chairman of the Committee on Scholarships and Student Aid, University of Wichita, Wichita 6, Kansas.

BILL C. TUCKER has left the Seismograph Service Corporation as party chief of a reflection-seismograph crew to become a seismologist with P. E. NARVARTE, consulting geophysicist, 307 Insurance Building, San Antonio, Texas.

The Shreveport Geological Society, Shreveport, Louisiana, listened to GEORGE HARRIS, geologist for the Ormond Corporation, at the State Exhibit Building, in February. The subject was "The Wesson Field, Arkansas."

JOSEPH J. ZORICHAK is administrative assistant in the office of the American Petroleum Institute at 1205 Continental Building, Dallas, Texas.

J. ROY MCCOY has resigned from the Anton Oil Corporation, Fort Worth, to open an office as consulting geologist at 3102 30th Street, Lubbock, Texas.

KENNETH G. BOLING, formerly geologist with the Pure Oil Company at West Branch, Michigan, is employed by S. D. Jarvis, 1005 Hulman Building, Evansville, Indiana.

W. FORD YOUNG is manager of the American International Fuel and Petroleum Company, Apartado 376, Managua, Nicaragua.

BENJAMIN A. DALEON is with the Far East Oil Development Company, Inc., in Manila, Philippine Islands.

A. C. BERTRAM is employed by D. D. Feldman, First National Bank Building, Houston, Texas.

N. B. SUAVE may be addressed in care of the Standard Vacuum Petroleum Maatschappij, Soengei Gerong, Palembang, Sumatra.

RONALD I. BAKER is with the Burmah Oil Company (India Concessions) Ltd., Box 272, Karachi, Pakistan.

O. C. LESTER, JR., has resigned from Amerada Petroleum Corporation and retired from active participation in geophysics. His new address is Box 326, Route 1, Aurora, Oregon.

W. K. ESGEN has been transferred to Cairo, Egypt, as assistant general manager of the Standard Oil Company of Egypt, S.A.

F. J. PETTIJOHN, of the department of geology of the University of Chicago, is the new editor of the *Journal of Geology*, succeeding R. T. CHAMBERLIN, who is now editor *emeritus*.

ARTHUR SEBERT PRICE, of the Gulf Oil Corporation, Chase, Kansas, died on January 31, at the age of 43 years.

A. A. CURTICE, of the United Engineering Corporation, New York City—and the world—talked before the Tulsa Nomads, February 2. On April 28, he addresses the graduating class of the United States Naval Academy, Annapolis, Maryland, on the "International Petroleum Situation and Its Relation to the United States Navy."

C. T. JONES, manager of foreign exploration for the Stanolind Oil and Gas Company, spoke on "Geology of the Rift Valleys of Africa," at the meeting of the Tulsa Geological Society, February 9.

ELVIN M. HURLBUT, JR., has completed the work toward his Master of Arts degree at the University of California and has accepted a position with the Shell Oil Company, Inc. His address is currently Box 549, Carlsbad, New Mexico.

GAGE V. LUND, of San Francisco, California, has been elected to the board of directors of the Standard Oil Company of California. Since 1945 he has been chairman of the board of the California Company and the Standard Oil Company of Texas.

SIDNEY A. STUBBS has closed his office in Tallahassee, Florida, and is now operating as a consulting geologist at 531 Esperson Building, Houston, Texas.

ROBERT M. BEATTY has changed from the International Petroleum Company, Ltd., Lima, Peru, to the Trinity Petroleum Company, Houston, Texas.

AUGUSTIN E. LOMBARD, recently assistant professor at the University of Geneva, Switzerland, has been appointed ordinary professor at the University Libre of Brussels, Belgium, and chairman of the department of geology.

JAMES W. KISLING, JR., has returned from 7 months with the Sinclair Oil Company in Ethiopia. He has resumed private consulting practice in the United States. His address is 1343 East 19th Street, Tulsa, Oklahoma.

T. J. BURNETT, JR., is with the Tide Water Associated Oil Company, Houston, Texas.

President C. E. DOBBIN, of Denver, Colorado, and secretary-treasurer J. V. HOWELL, of Tulsa, Oklahoma, were in Calgary, Canada, the last week in February, visiting the Alberta Society of Petroleum Geologists.

Past-president EARL B. NOBLE is in Paraguay for several weeks, where the Union Oil Company of California is exploring for oil.

The Geological Forum of the Pacific Section met at the University of California at Los Angeles, February 16. The following papers were presented: "Geology of the Dominguez Oil Field," by ALBERT F. WOODWARD, Union Oil Company of California; "Aspects of the Geology of Portugal," by CLIVE A. MENDELSON, consulting geologist; and "Colored Movies of the Navy's Work in the Arctic," by Captain VIC WILHELM, United States Navy.

JOHN R. GISBURNE has resigned from the Shell Oil Company, Inc., and is associated with GEORGE P. HARDISON, 426 Wichita National Bank Building, Wichita Falls, Texas.

RICHARD N. SPENCER, formerly with the Magnolia Petroleum Company is in the employ of the Union Oil Company of California at Corpus Christi, Texas.

IRVIN B. MURRAY, JR., has left the McCarthy Oil and Gas Company. He is in the geological department of The California Company, New Orleans, Louisiana.

GEORGE R. HEYL, recently with the United States Geological Survey, is now with the Creole Petroleum Corporation, Caracas, Venezuela.

WALTER J. OSTERHOUDT, of the Gulf Research and Development Company, discussed "Seismograph Exploration of an Ancient Mississippi River Channel," before the Houston Geological Society, February 9.

The American Association for the Advancement of Science Centennial Celebration will be held in Washington, D. C., September 13-17.

The International Petroleum Exposition Silver Jubilee will be held in Tulsa, Oklahoma, May 15-22.

SHERMAN A. WENGERD, assistant professor of geology at The University of New Mexico, Albuquerque, is president of the University of New Mexico Aeronautical Association, a flying club dedicated to the advancement of flying in New Mexico.

CHARLES H. DRESBACH, formerly assistant manager and chief geologist, became general agent of the Colombian Gulf Oil Company with headquarters in Bogota, Colombia, effective February 1. His last domestic assignment was with the Western Gulf Oil Company.

R. M. SWESNIK, Anderson-Prichard Oil Corporation, Oklahoma City, Oklahoma, spoke on "Stratigraphic Convergence Problems in Oil Finding," before the Tulsa Geological Society, February 23.

HAROLD R. WANLESS, professor of geology at the University of Illinois, spoke on February 12 at East Lansing, Michigan, to the Michigan Geological Society on "Cycles in the Deposition of Sediments." On February 13, he spoke at the University of Michigan at Ann Arbor on "The Graphic Representation of Sedimentary Facies," and "The Stratigraphic Column of the Camp Davis Region."

JOHN H. DAVIS has resigned from the Ohio Oil Company to accept employment with the Continental Oil Company, Lafayette, Louisiana.

LAURENCE BRUNDALL, vice-president of Geophoto Services, Denver, is spending several months in Brazil as advisor to the Brazilian National Petroleum Council on photogeological exploration.

ROBERT THURRELL, recently with the Alaska branch of the United States Geological Survey and CURTIS AMUEDO, recently graduate student and instructor at Louisiana State University, are now with Geophoto Services, Denver.

The annual meeting of the Alberta Society of Petroleum Geologists was held on January 12, in the Palliser Hotel, Calgary, Alberta. The following officers were elected for 1948: W. P. HANCOCK, president; D. PENNER, vice-president; F. A. MCKINNON, business manager; J. G. GRAY, secretary-treasurer.

MARTIN G. MILLER, of the J. S. Abercrombie Company, spoke on "Practical Aspects of Gas Cycling," before the Houston Geological Society, February 23.

The Pacific Section of the Association held a luncheon meeting, March 4, at the Clark Hotel, Los Angeles. ROBERT P. SHARP, professor of geomorphology at California Institute of Technology spoke on "Geological Exploration in the St. Elias Range, Canada."

M. W. FULLER, of Tulsa, Oklahoma, has resigned his position as chief geologist of the Carter Oil Company, and will engage in private consulting practice.

GEORGE A. MUSSELMAN has been appointed chief geologist of the Carter Oil Company, Tulsa, Oklahoma.

The executive committee of the Association has authorized the appropriation of a nominal amount to assist CHARLES E. DECKER in the completion of his research study of the Athens shale, a project in which he has been engaged for several years.

The Missouri School of Mines and Metallurgy and the State Mining Experiment Station offer several opportunities to qualified graduate students for appointment as research fellows or graduate assistants. Applications are invited (before May 1) from men holding either a Bachelor of Science degree or a Master of Science degree in special fields, as designated (geology). The remuneration or stipend for fellowships and assistantships is \$750 and \$810, respectively, for the academic year extending from September 1 to June 1. Further information may be obtained from J. D. FORRESTER, Chairman, Committee on Graduate Study, Missouri School of Mines, Rolla, Missouri. The Shell Union Oil Corporation fellowship for graduate research in petroleum production engineering carries a stipend of \$1,200; in addition, fees and allowances up to \$300 are granted for purchase of material and equipment.

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 - I. Libraries furnishing photostat and microfilm service
 - J. Thin-section and rock-polishing service
- II. Specific Material:—State and Province in area
- A. Canada, by provinces, and Newfoundland
 - B. Central American countries
 - C. Mexico
 - D. United States—states and territories

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University of Wichita, first Tuesday of each month.
Noon luncheons, first and third Monday of each
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the Kansas Well Log Bureau, 412 Union National
Bank Building, and the Kansas Well Sample Bu-
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Union Producing Company, Box 1628
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Special meetings by announcement. Visiting geo-
logists cordially invited.

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Meetings: Dinner and business meetings third Tuesday of each month at 7:00 P.M. at the Majestic Hotel. Special meetings by announcement. Visiting geologists are welcome.

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Capitol Savings and Loan Bldg., Lansing
Business Manager Jack Mortenson
Sohio Petroleum Company, Mt. Pleasant

Meetings: Monthly, November through May, at Michigan State College, East Lansing, Michigan. Informal dinners at 6:30 P.M., followed by discussions. Visiting geologists are welcome.

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Tower Building

Meetings: First and third Thursdays of each month, from October to May, inclusive, at 7:30 P.M., Edwards Hotel, Jackson, Mississippi. Visiting geologists welcome to all meetings.

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Dinner meetings will be held at 7:00 P.M. on the first Wednesday of every month from October to May, inclusive, at the Ardmore Hotel.

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Meets the fourth Thursday of each month at 8:00 P.M., at the Aldridge Hotel. Visiting geologists welcome.

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Meetings: Technical program each month, subject to call by Program Committee, Oklahoma City University, 24th Street and Blackwelder. Lunches: Every second and fourth Thursday of each month, at 12:00 noon, Y.W.C.A.

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Sinclair Prairie Oil Company, Box 521
Secretary-Treasurer V. L. Frost
Ohio Oil Company, Thompson Building
Editor Robert F. Walters
Box 661, Gulf Oil Corporation

Meetings: First and third Mondays, each month, from October to May, inclusive, at 8:00 P.M., University of Tulsa, Student Union or Tyrrell Hall. Luncheons: Every Friday (October-May), Chamber of Commerce Building.

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Meetings held each month, except during the summer. All meetings and other activities by special announcement.

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Secretary-Treasurer Riley G. Maxwell
Consulting Geologist
Box 1939

Meetings: 2d Thursday of each month, 7:00 P.M., Wooten Hotel.

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Meetings: Monthly luncheons and night meetings by announcement.

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Meetings: Luncheon at noon, Hotel Texas, first and third Mondays of each month. Visiting geologists and friends are invited and welcome at all meetings.

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Luncheons: Each week, Monday noon, Blackstone Hotel.

Evening meetings and programs will be announced. Visiting geologists and friends are welcome.

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Regular meeting held the second and fourth Mondays at noon (12 o'clock), Mezzanine floor, Rice Hotel. For any particulars pertaining to the meetings write or call the secretary.

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Meetings: Luncheon 1st and 3d Wednesdays of each month, 12:00 noon, Y.W.C.A. Evening meetings by special announcement. Visiting geologists and friends are cordially invited to all meetings.

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Standard Oil Company of Texas, Box 2087

Meetings: Luncheon 1st and 3d Wednesdays of each month, 12:00 noon, Herring Hotel. Special night meetings by announcement.

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Meetings will be announced.

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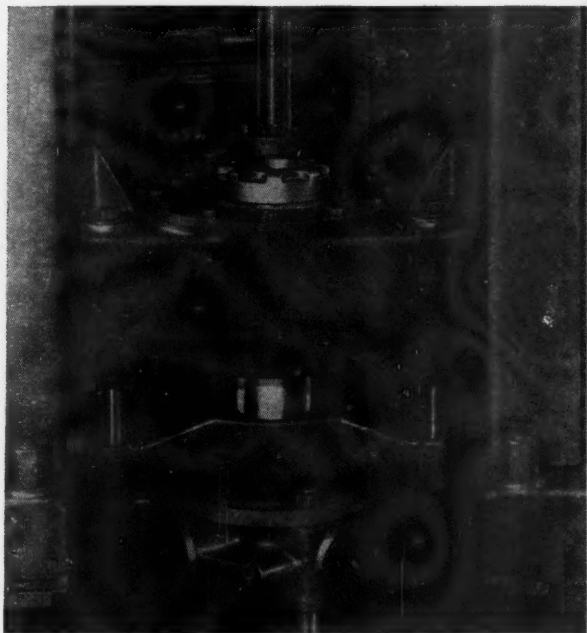
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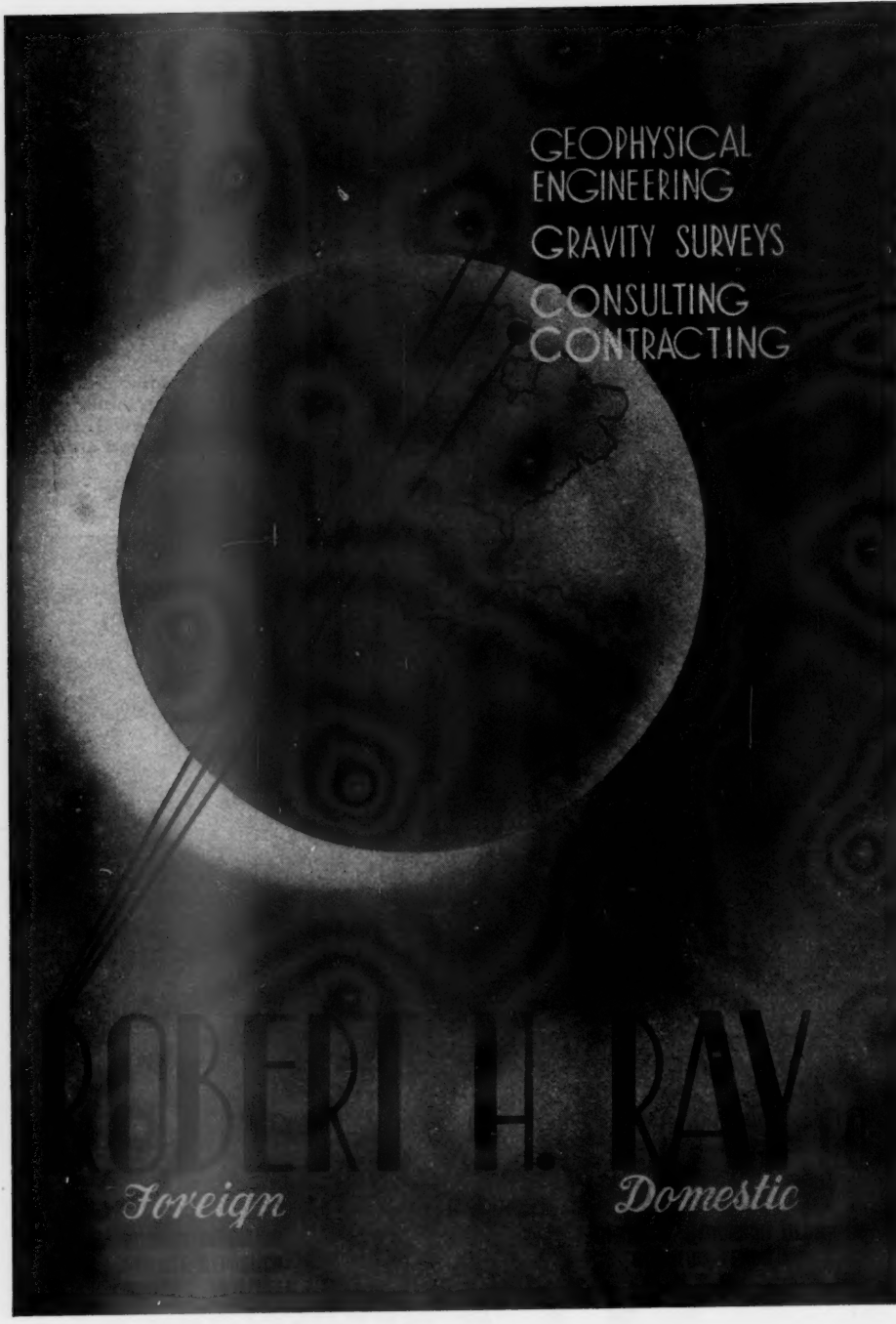


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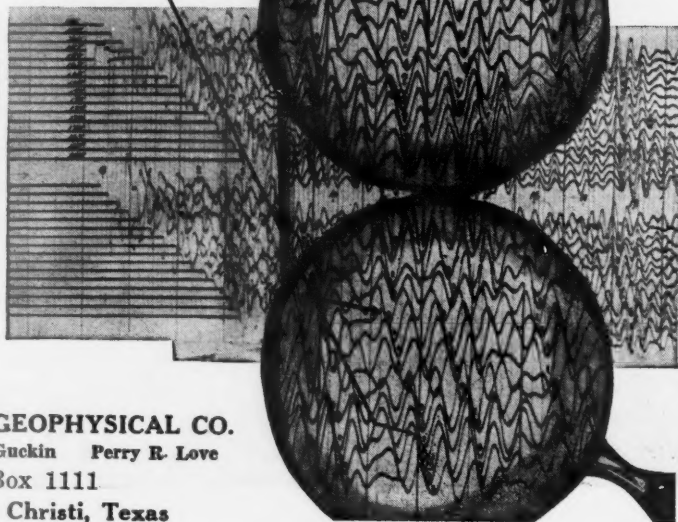
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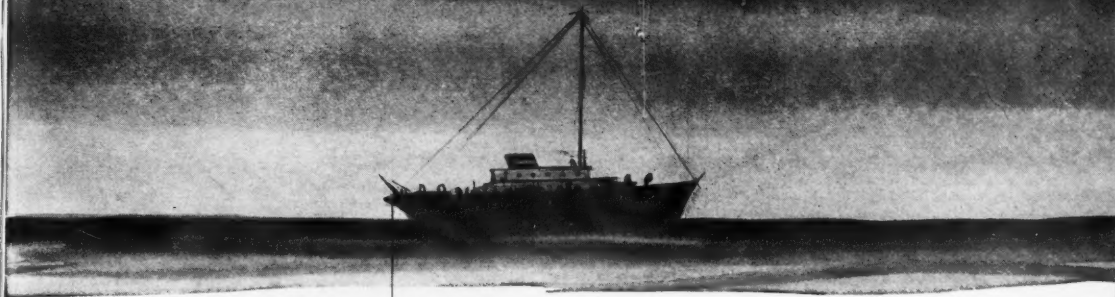


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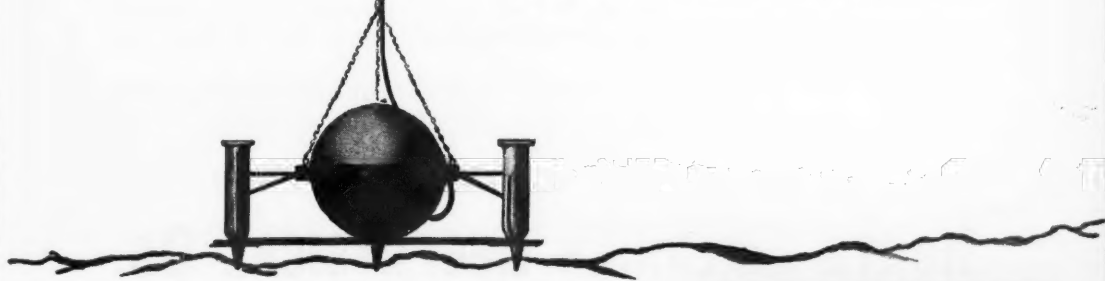


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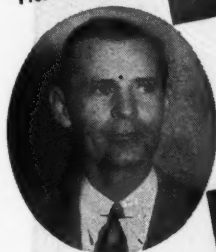
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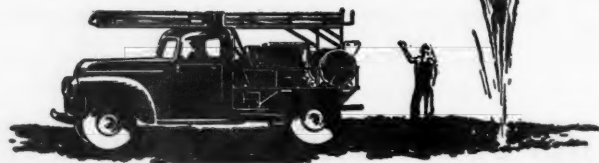
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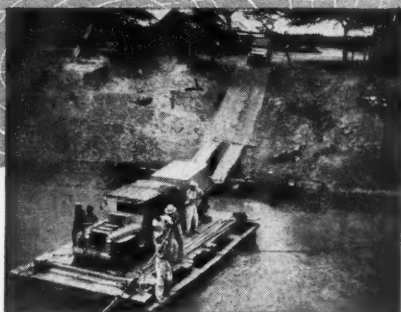
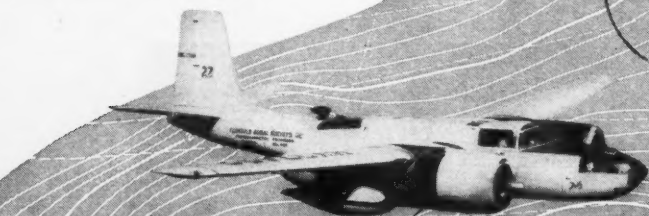
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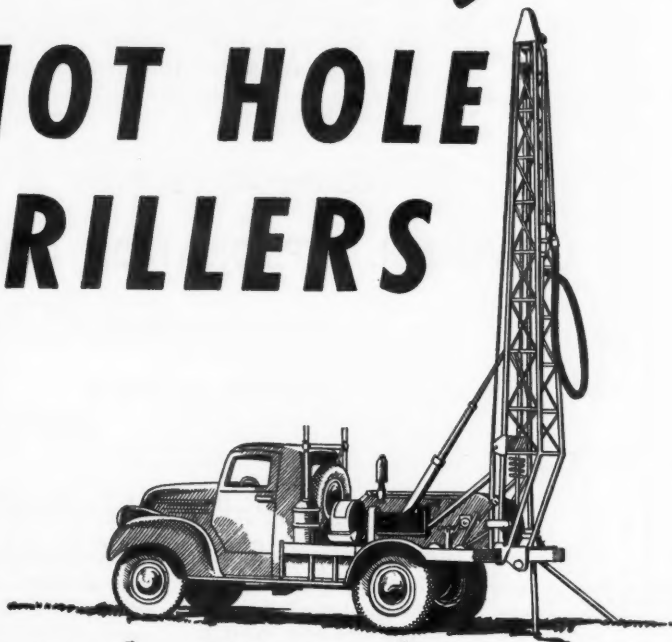
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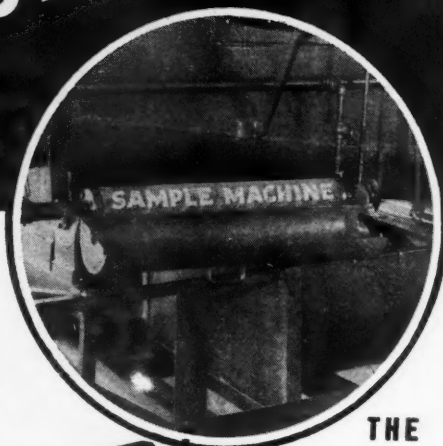
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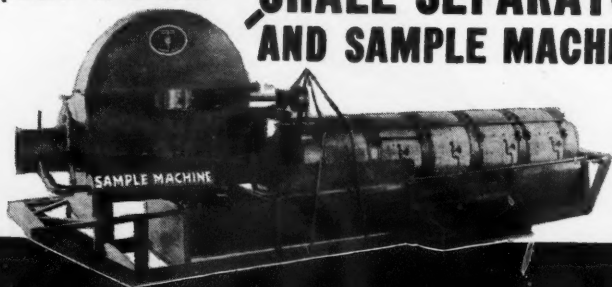
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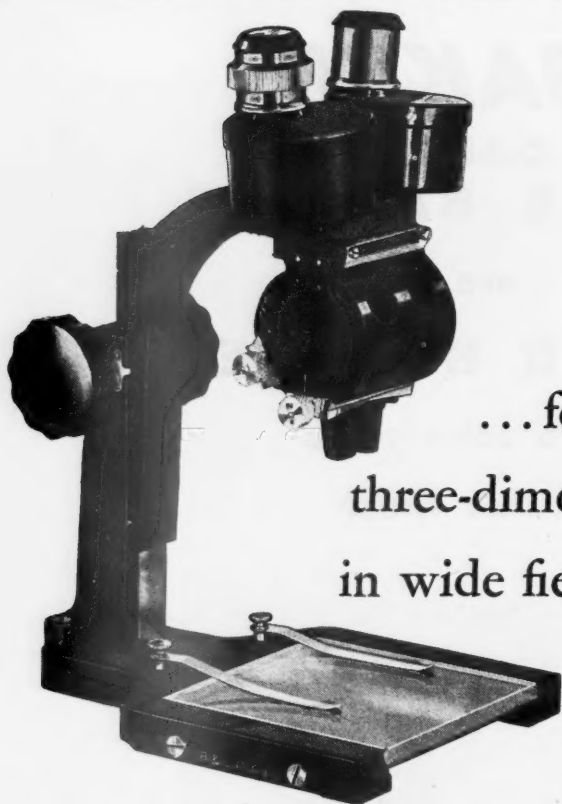


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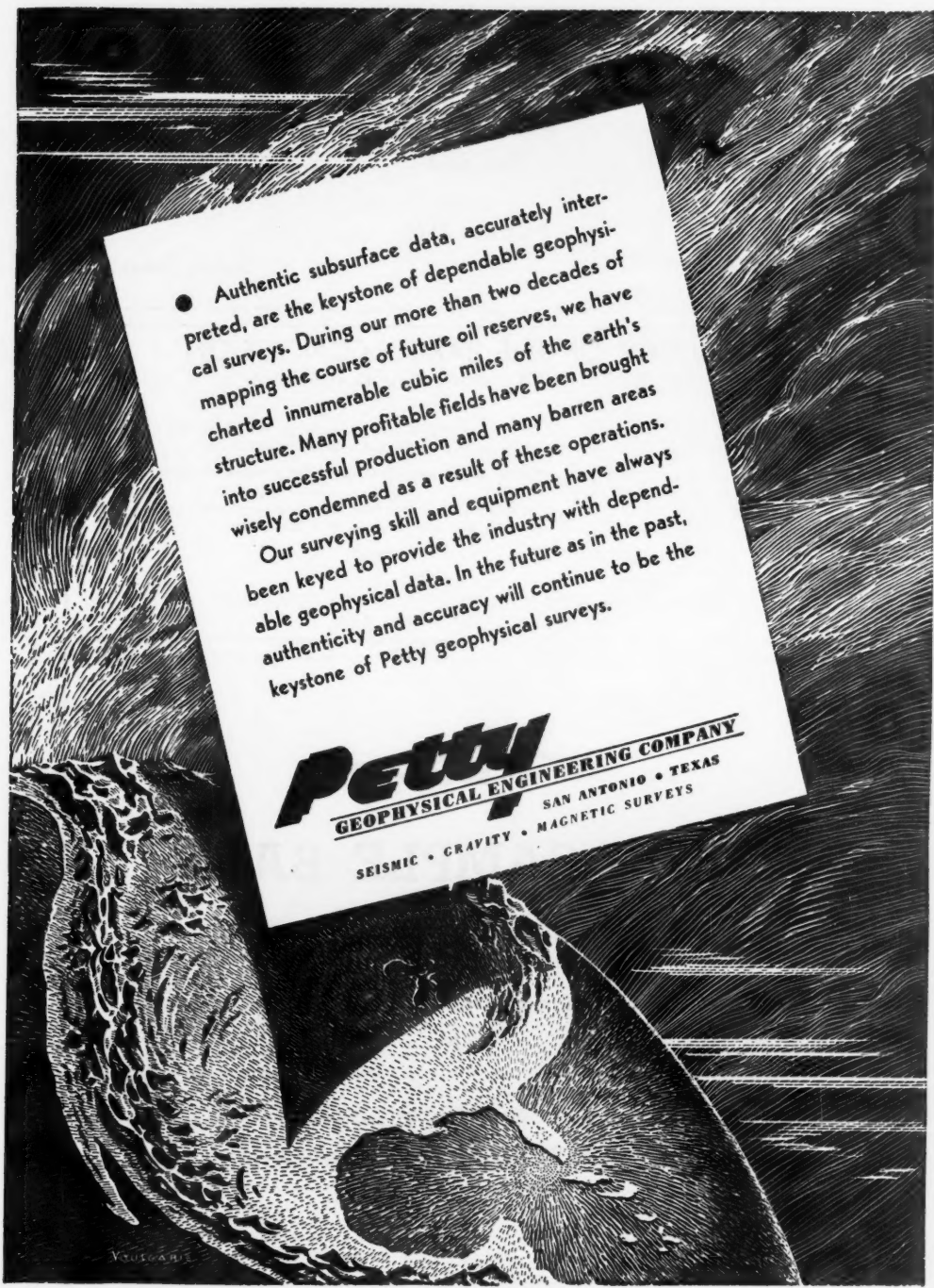


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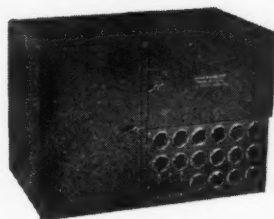
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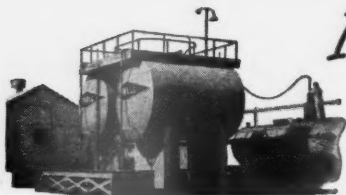
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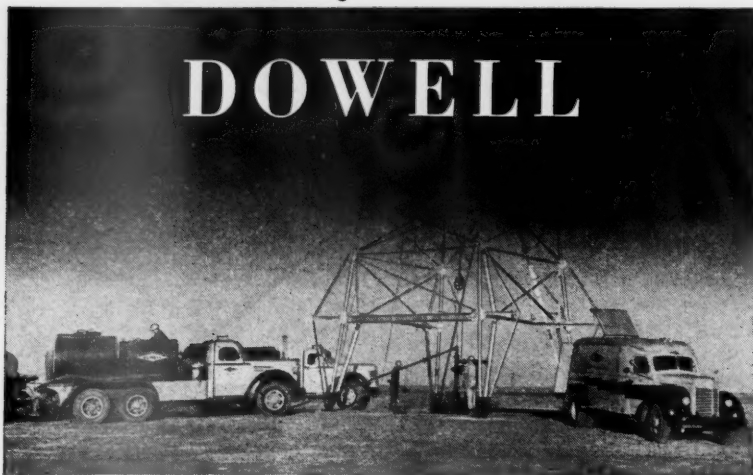
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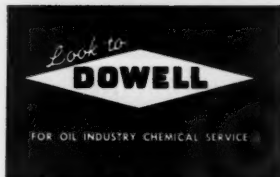


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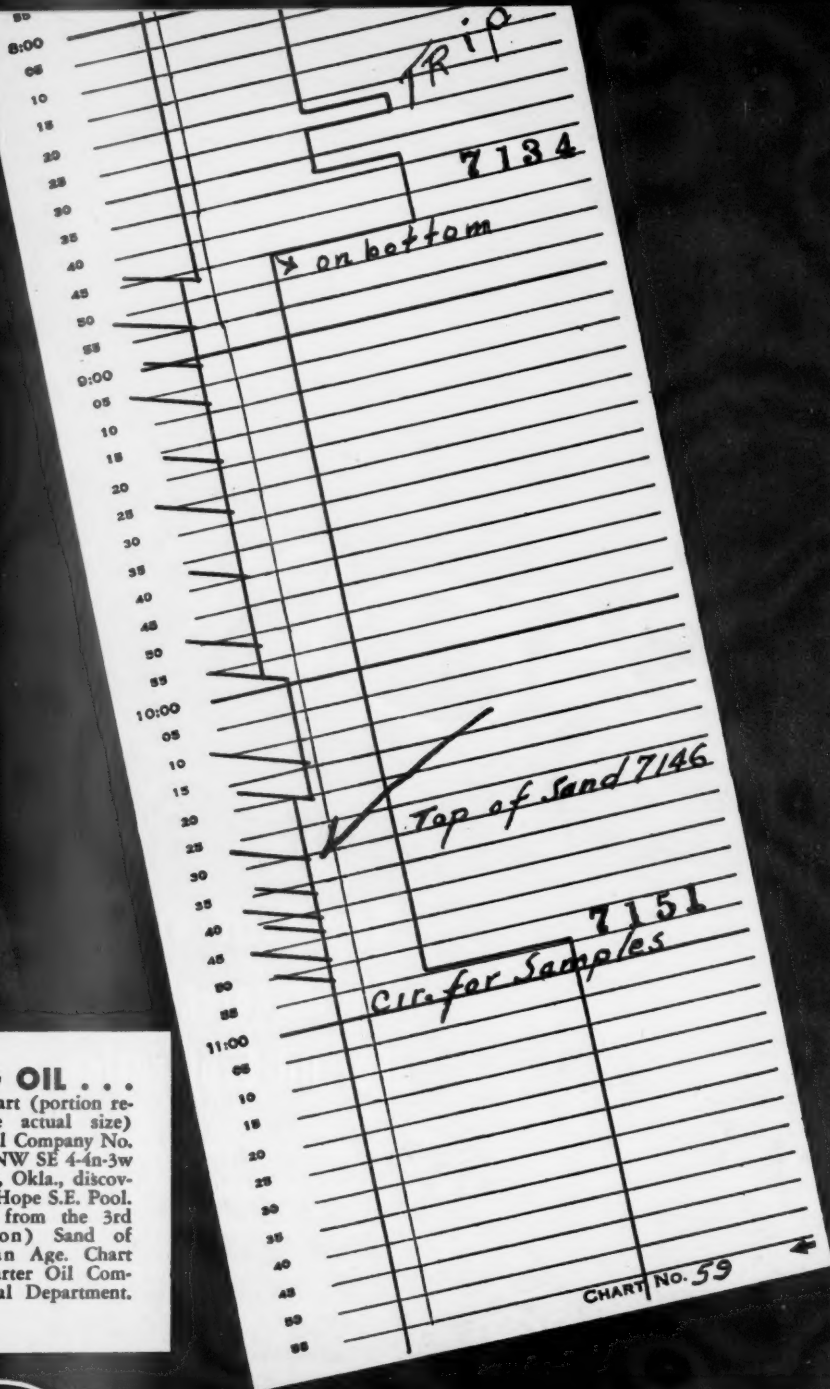
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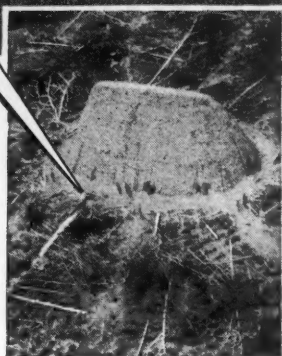
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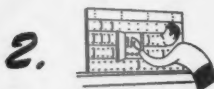
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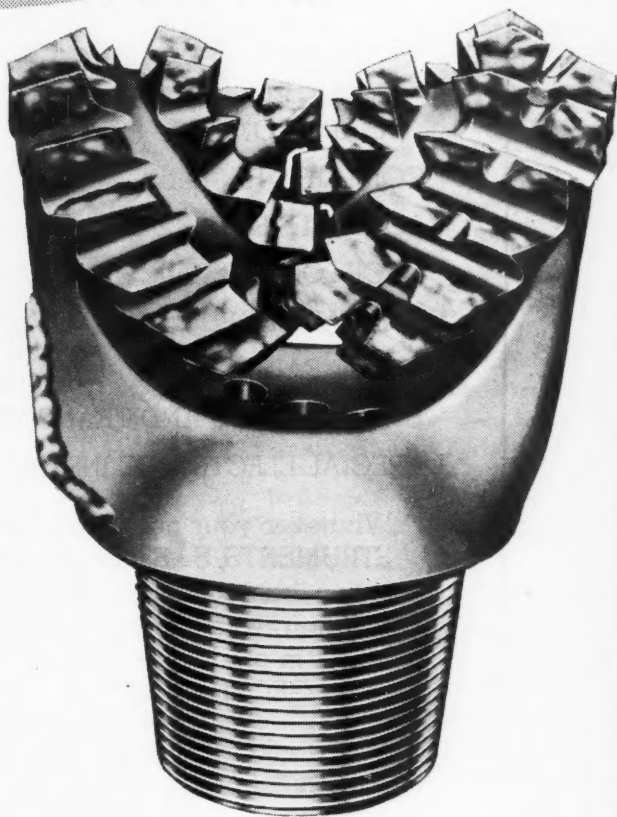
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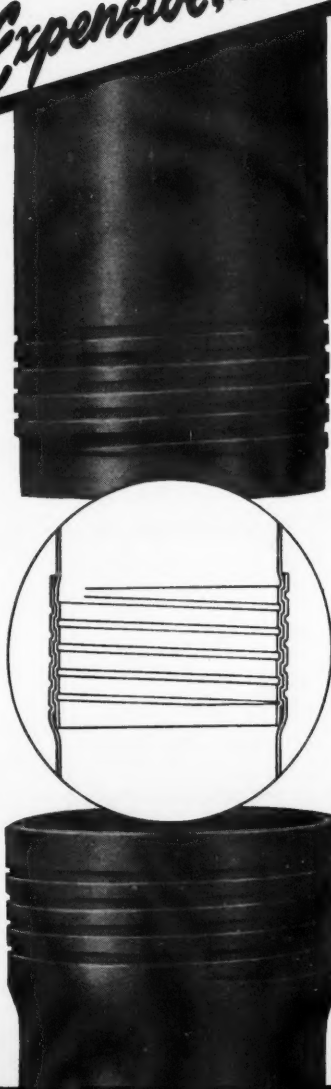
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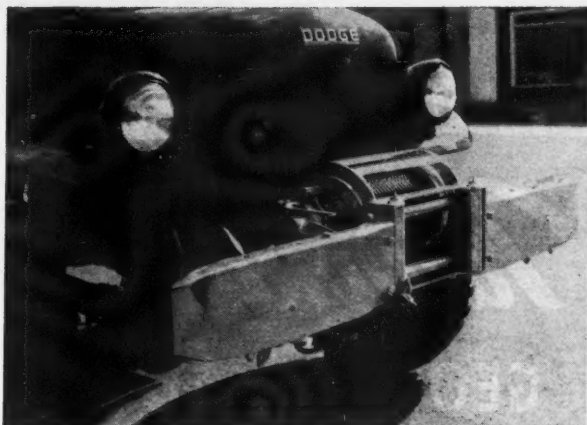
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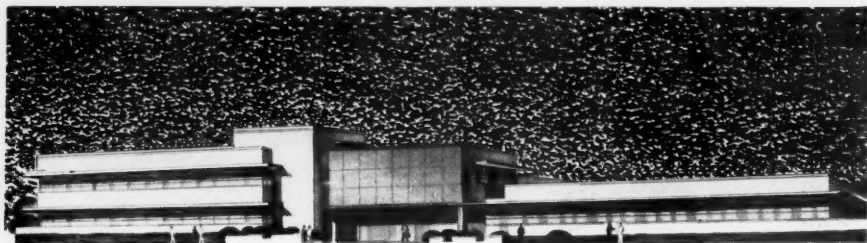
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